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State of Montana

Long Range
Information Processing
Plan – Phase I

Volume I

December, 1976

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STATE OF MONTANA
DEPARTMENT OF ADMINISTRATION
DIRECTOR'S OFFICE
MITCHELL BUILDING
HELENA, MONTANA 59601

THOMAS L. JUDGE, Governor

December 31, 1976

The Honorable Thomas L. Judge
Governor of Montana
State Capitol
Helena, Montana 59601

Dear Governor Judge:

In compliance with Executive Order 5-76, I am happy to present you with the Department of Administration's Long-Range Information Processing Plan. This report represents another step in your administration's continuing effort to better manage and control the use of the State's resources.

While this report briefly summarizes the past and present history of information processing in the State, the major portion of the report looks to the future. The principal benefit to be gained from this study lies in the future as the State better controls and monitors the growth of information processing.

The Department of Administration plans to immediately proceed with the Phase II recommendations as the staff and funds become available to enable us to proceed with this project.

Sincerely,

Jack C. Crosser

Jack C. Crosser
Director

JCC:dm

FOREWARD

Information processing is playing an ever-increasing role in State government operations. This report represents the State's first comprehensive effort to summarize the growth, impact and future of information processing in State government.

This Long-Range Information Processing Plan should be of particular interest to legislators and government officials. It contains specific organizational and planning recommendations to better control and manage the growth of the State's information processing resources, while also being more responsive to the needs of current and future users of these resources.

This report completes the first phase of this planning project. The long-range phase, as outlined in this report, is yet to be done. A good foundation has been laid, and efforts are underway to proceed on Phase II of this project. The Department of Administration, along with interested persons throughout State government, must immediately implement Phase II recommendations if full value from this study is to be realized.

A report of this scope and magnitude represents thousands of hours of work in a very short period of time by many dedicated people. Major credit for this report goes to the following:

- Governor's Data Processing Policy Committee
  Provided general project policy direction and approved the final report.
- Arthur Andersen & Co. - Consultant
  Assisted in directing the project, conducting the field surveys and writing the report.
- Data Processing Planning Team
  Gathered the field survey information from throughout State government.
- Department of Administration Project Staff
  Provided general assistance to the consultant throughout the entire project.

Doyle B. Saxby
Project Director

ACKNOWLEDGEMENTS

STATE OF MONTANA

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Doyle B. Saxby	Deputy Director

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REPORT ON PHASE I

Development of a Statewide,
Long-Range Information Processing Plan

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CHAPTER 1 EXECUTIVE SUMMARY

1. EXECUTIVE SUMMARY

This chapter presents an overview of the results of Phase I of a project to develop a statewide, long-range information processing plan. Sections included in this chapter are:

1.1 Scope of the Plan

1.2 Phase I Recommendations

1.1 Scope of the Plan

On June 23, 1976, the Governor issued Executive Order 5-76 which directed "...the Department of Administration, in accordance with general policy direction established by the Data Processing Policy Committee, and in cooperation with other departments of the executive branch, to develop and annually update a long-range data processing plan for the fiscal years 1977 through 1981." Further, it was directed that the plan "...provide for the most effective and efficient utilization and coordination of data processing personnel and facilities..."

As the first step, the Department of Administration and the Policy Committee addressed the question of whether or not the existing policies, organization, assignment of responsibilities, etc., would permit the above directives to be met. The answer was NO! The reasons for this determination are briefly presented below:

1. There exists no mechanism for taking a statewide perspective of information processing (a better term than the more common, but restrictive, term data processing).

2. There does not exist a carefully thought out set of policies and guidelines to serve as reference points in the planning process and development of information processing capabilities.

3. The present situation has led to a type of adversary relationship between the Department of Administration, which operates the State's largest computer, and other agencies.

4. The State of Montana has taken a "bottom-up" perspective in planning for the use of computers and related resources. In its

simplest terms, "bottom-up" planning occurs when resource levels are determined by adding up all known requirements.

Because of this situation, it became clear that before a statewide plan could be implemented, it would be necessary to:

1. Insure that key policies and guidelines are examined and redefined as necessary.

2. Insure that clearly defined organizational structures and responsibility assignments are developed and put in place.

3. Develop certain procedures to assist the biennial planning and continuous planning processes (to include setting of priorities).

In view of this determination and the short time and limited resources available, the Department of Administration suggested to the Data Processing Policy Committee that the scope of the plan to be delivered by the end of December be limited. The Department recommended that the long-range plan be developed in two phases:

Phase I - This would involve a relatively high level review of selected State agencies, and would be completed by December 31, 1976. This phase would address some very fundamental areas, such as how the statewide information processing function should be viewed organizationally and what changes are required before a statewide plan can be implemented.

Phase II - This would involve a detailed review of all State government, and would be completed by December 31, 1977. During this phase key recommendations from Phase I would be implemented, critical issues identified in Phase I studied and recommendations developed and a more detailed, long-term plan prepared.

The recommendation was accepted and work on Phase I commenced in late September.

The scope and objectives for Phase I were defined as follows:

1. Conduct reviews and evaluations of the various information processing centers and systems groups throughout the State (except for those in the University System as discussed below).

2. Survey selected agencies in order to determine critical, short- and long-term systems development requirements.

3. Define key policies and objectives for information processing within the State.

4. Define procedures for developing, updating and modifying the long-range plan to reflect changing conditions and priorities.

5. Define the priorities for addressing identified needs.

6. Develop recommendations and prepare a written report summarizing the results of Phase I.

Relative to the University System, the scope of Phase I was restricted to administrative systems.

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1.2 Phase I Recommendations

Recommendations resulting from Phase I have been grouped into four categories to facilitate discussion:

1. Positioning recommendations - These will enable the State to execute, monitor and update the long-range plan. Four areas are addressed by these recommendations:
   a. Organization and assignment of responsibilities.
   b. Biennial and continuous planning.
   c. Systems project planning and control.
   d. Equipment utilization planning and control.
2. Critical issue recommendations - Two tasks are recommended for early completion due to potential budgetary implications in the current fiscal year.
3. Completing the detail plan - This recommendation defines the steps required to complete the initial, six-year plan.
4. Other related recommendations - Additional tasks which should be completed during development of the detail plan are discussed.

These recommendations are briefly discussed below.

Organization and Assignment of Responsibilities

Chapter 3 of this report presents a detailed analysis of organizational objectives, alternatives and recommendations. Basically, the thrust of the recommendations is that Montana's current organizational structure will provide the framework for effective management of the information processing function if certain roles and responsibilities are strengthened and formalized. Specific recommendations include the following:

1. Create a statewide information processing program to accumulate and summarize budgetary and expenditure data to assist in the administration of the information processing function.
2. Require agencies with in-house systems development or computing resources to justify the need for these resources biennially.
3. Formalize the responsibilities of the various entities in satisfying the State's information processing requirements, to include the Department of Administration and the Office of Budget and Program Planning.

4. Extend Executive Order 5-76 to create a committee to function as a viable advisory body (the Montana Data Processing Advisory Committee, or MODPAC).

5. Assign the responsibility for setting systems development priorities to the user agency and the data processing center impacted.

6. Formalize policies and guidelines for satisfying information processing requirements.

Biennial and Continuous Planning

Completion of Phases I and II of the long-range information processing planning project will result in the development of the initial six-year plan. Once the detail plan is developed, the mechanisms must be in place to update the plan so that it reflects current needs and priorities. Chapter 4 presents the on-going planning processes recommended to meet this requirement. These are:

1. The biennial planning process through which the plan is formally updated and needs are projected for the next six years.

2. The continuous planning process through which unanticipated needs and events are inserted into the plan.

3. The priority setting mechanism which addresses the methodology for assigning priorities to projects.

Systems Project Planning and Control

Chapter 4 also addresses effective systems project management, which is essential to implementing and monitoring the long-range plan. The recommendations encompass five areas:

1. A standard approach to systems project planning.
2. Systems design standards.
3. Estimating guidelines.
4. Project reporting and control.
5. Effectiveness audits.

Equipment Utilization Planning and Control

The last positioning recommendation discusses the need for a general operations reporting and control scheme for use statewide and recommends a project to develop these techniques.

Critical Issue Recommendations

It is recommended that two tasks be undertaken because of the potential for immediate budgetary implications. These are:

1. A computer rate study to develop an equitable charge-back policy which minimizes discrimination between resources used.

2. An equipment centralization/decentralization study to reconfirm the consolidation of the Department of Highways computer with the Department of Administration's.

Completing the Detail Plan

It is recommended that the initial long-range information plan be developed by undertaking Phase II of the project. Chapter 6 of this report discusses the required steps.

Related Recommendations

Three tasks are recommended for completion in conjunction with the effort to prepare the initial long-range plan. These are:

1. A study of training, skills upgrade and career paths to improve the development and retention of personnel.

2. A data base study to determine potential data base applications and recommend software.

3. A study of statewide systems requirements to identify needs that can be satisfied by shared, statewide systems.

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CHAPTER 2 JUSTIFICATION AND BACKGROUND FOR STATEWIDE PLAN

2. JUSTIFICATION AND BACKGROUND FOR STATEWIDE PLAN

Sections included in this chapter are:

2.1 Historical Perspective
2.2 Data Processing Today
2.3 Need for a Plan
2.4 Scope and Study Limitations
2.5 Study Approach

2.1 Historical Perspective

There were fewer than 40 computers in the United States less than twenty years ago. Now there are over 80,000 installations. No other development in technology has affected so many human activities in such a short time. Computer data processing has influenced the basic techniques of scientific inquiry, provided new methods and capabilities for national defense, drastically influenced the conduct of business enterprise and helped make government more efficient. It has also become the eleventh largest industry in the United States (30 billion dollars or 2.7% of the GNP). Some economists have predicted that data processing will become the third largest industry in the United States by 1980.

Within the government of the State of Montana, the impact of the computer and the demand for data processing have likewise been very significant. Figure 1 illustrates the growth in computer hardware from a single IBM 650 computer at Montana State University in 1958 to the nine general purpose computers presently in use.

Since 1958, continuing efforts have been made through legislation, planning and the establishment of policies to see that data processing develops under some sense of direction in the State of Montana. In May, 1964, the Governor's Office issued an Executive Order to the Department of Administration to conduct a study of all electronic information processing equipment. The purpose of the study was to develop recommendations to eliminate duplication of equipment and assure that existing equipment was being fully utilized. The Department study recommended the consolidation of several data processing facilities within the State. These consolidated facilities have operated under management of the Department of Administration since 1965, when the Legislature established a Central Data Processing Revolving Fund for the operation of the Department's data processing service center on a cost recovery basis. Presently, only the Department of Highways, the Office of the Superintendent of Public Instruction and several of the University units operate general purpose computers outside the Department of Administration.

During the 1967 legislative session a bill was passed charging the Department of Administration with the responsibility of providing centralized data processing services and approving acquisition and location of all data processing equipment. The Superintendent of Public Instruction's Office was expressly exempted but was later included when the statute was amended. The statutes pertaining to data processing are quoted below:

> Section 82-3306, R.C.M. 1947,
>
> "The department of administration shall maintain and supervise any central mailing, messenger service, data processing, duplicating, and copying facilities for state agencies in the capitol area. Cost records shall be maintained and agencies shall be billed for services received."
>
> Section 82-1915.1, R.C.M. 1947,
>
> "The department shall adopt rules governing the procurement and utilization of data processing equipment, programs and data processing communication networks, duplicating and copying equipment, and equipment generally prescribed for automatic typing. The department shall supervise the procurement and location of this equipment, for all State agencies."

FIGURE 1

STATE OF MONTANA
COMPUTER SYSTEMS INSTALLED
1958 - 1976*

	GENERAL GOVERNMENT				UNIVERSITY SYSTEM**			
Calendar Year	Department of Administration	Department of Highways	Superintendent Of Public Instruction	Other Departments	Montana State University	University of Montana	Montana School of Mines	Eastern Montana College
1958					IBM 650			
1959		IBM 650						
1960								
1961		IBM 1620-1			IBM 1620-1			
1962		IBM 1401		IBM 650***				
1963								
1964				IBM 1440***	IBM 1620-2 IBM 1401	IBM 1620-1		
1965	IBM 1440							
1966	IBM 360/30		Honeywell H200					
1967		IBM 360/30						IBM 360/20
1968		IBM 360/ 40			Xerox Sigma 7		IBM 1620-2	
1969					Univac 9300			
1970	IBM 360/40				IBM 360/25			
1971						DEC PDP 10		
1972	IBM 370/135		Honeywell H115-2					
1973	IBM 360/30 IBM 370/145	IBM 370/145						
1974								
1975	IBM 370/158							
1976	IBM 360/40						DEC PDP 11/70	
Presently Installed Computers	IBM 370/158 IBM 360/40	IBM 370/145	Honeywell H115-2	None	Xerox Sigma 7	DEC PDP 10	DEC PDP 11/70 IBM 1620-2	IBM 360/20

---

* All computer systems presently installed are purchased or being purchased.

** There are a number of mini computers installed in the University System not shown on this chart. They are used for research and as laboratory equipment.

*** Installed by Liquor Control Board.

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Many other states have had very traumatic experiences with data processing and in some cases more than once. Problems and mistakes in the use and control of computers have been relatively minor in Montana. Montana has escaped major difficulties with data processing for a couple of reasons.

1. Montana established central control over computer equipment acquisitions before computers became widely used or entrenched throughout State government.

2. Montana, being a relatively small state, has problems which are admittedly easier to handle.

Nevertheless, the statewide growth in computer capacity and other data processing resources has been awesome.

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2.2 Data Processing Today

There are presently 447 state employees whose primary function is in the area of information processing. 370 of these employees are in general government and 77 in the University System. The employees are distributed functionally as shown in the following table.

TABLE 1

FULL-TIME EQUIVALENT INFORMATION PROCESSING POSITIONS

	GENERAL GOVERNMENT			UNIVERSITY SYSTEM	
FUNCTIONAL AREA	NUMBER	%	NASIS %	NUMBER	%
Administration	25	7	7	9	12
Systems & Programming	112	30	28	32	42
Operations	104	28	24	19	24
Data Entry	129	35	41	17	22
TOTAL	370	100	100	77	100

The National Association for State Information Systems (NASIS) annually surveys all 50 states to gather statistics. A comparison of the distribution in the functional areas has been shown in Table 1 for general government versus statistics from the 1976 NASIS Report. This comparison indicates that the State of Montana is in basic conformity with the nation as to mix of information processing personnel. Statistics are not available from NASIS for the University System.

Anticipated expenditures for these 447 positions during the current fiscal year will exceed five million dollars as illustrated in Table 2.

TABLE 2

ANTICIPATED INFORMATION PROCESSING PERSONNEL EXPENDITURES
1976-77

	GENERAL GOVERNMENT			UNIVERSITY SYSTEM		
FUNCTIONAL AREA	FTE'S	EXPENDITURES	%	FTE'S	EXPENDITURES	%
Administration	25	$ 434,000	10	9	$ 137,000	13
Systems & Programming	112	1,668,000	39	32	519,000	52
Operations	104	1,180,000	27	19	219,000	22
Data Entry	129	1,034,000	24	17	132,000	13
TOTAL	370	$4,316,000	100	77	$1,007,000	100

The annual expenditures for information processing equipment by State government is expected to be $2,320,000 in fiscal 1976-77. Distribution of these expenditures by equipment category is shown in Table 3. Figure 1 provided information on the type and location of computer main frames.

TABLE 3

ANTICIPATED INFORMATION PROCESSING EQUIPMENT EXPENDITURES
1976-77

	GENERAL GOVERNMENT		UNIVERSITY SYSTEM	
CATEGORY	EXPENDITURES	%	EXPENDITURES	%
Computer Main Frame	$ 772,000	40	$ 75,000	19
Computer Peripherals	460,000	24	196,000	50
Communications	467,000	24	53,000	14
Miscellaneous	231,000	12	66,000	17
TOTAL	$1,930,000	100	$ 390,000	100

The rather low annual expenditure for computer main frames relative to other hardware categories is because in Montana computer main frames are generally purchased. This is reflected in a comparison of general government data processing expenditures with national averages as shown in Table 4. The national figures are from the 1976 NASIS report. Again, University System figures are not available from NASIS.

TABLE 4

ANTICIPATED DATA PROCESSING EXPENDITURES COMPARED TO NATIONAL AVERAGE EXPENDITURES
1976-77

CATEGORY	GENERAL GOVERNMENT ACTUAL	GENERAL GOVERNMENT EQUIVALENT*	GENERAL GOVERNMENT %	NASIS %	UNIVERSITY SYSTEM ACTUAL	UNIVERSITY SYSTEM %
Personnel	$4,316,000	$4,316,000	56	50	$1,007,000	66
Equipment	1,930,000	2,354,000	31	34	390,000	26
Outside Services	667,000	667,000	8	6	Not reported	0
Software	43,000	43,000	1	1	2,000	nil
Supplies, etc.	320,000	320,000	4	9	126,000	8
	$7,276,000	$7,700,000	100	100	$1,525,000	100

* Per the NASIS report, most equipment is leased by other states. Montana agencies typically purchase computer main frames. In order to make the general government and NASIS percentages more comparable, a "lease equivalent" amount for equipment expenditures has been included. The "lease equivalent" amount has been calculated by amortizing purchase prices over an average expected life of 44 months.

The total anticipated expenditure of $8,801,000 ($7,276,000 general government costs + $1,525,000 Univeristy System costs) for fiscal 1976-77 should be viewed as a minimum. Only the Department of Administration has an information processing program that facilitates accumulation of information processing costs. This has necessitated a special analysis of other agency budgets to determine the total, statewide information processing expenditures as shown above. When compared to the State's total annual budget of $688,000,000, it can be seen that over 1.00 percent is spent for information processing in the general government area. This compares to the 1976 NASIS figure for a national average of 0.62 percent for general government (again comparative figures for the University System are not available from NASIS).

A more detailed analysis of the cost of information processing and related major applications being processed throughout the State appears in Appendices I and II, respectively.

2.3 Need for a Plan

Since 1970, there has been a tremendous growth in the utilization of information processing in State government. This growth is vividly illustrated in Figure 2, which shows that the Department of Administration's computer center utilization has quadrupled since 1973.

The current status of information processing in the State of Montana is one of unplanned, although somewhat coordinated, growth. The basic philosophy has been to provide the requested services if funding is or can be made available. There has been no conscious effort to limit the total level of statewide information processing expenditures or the rate at which expenditure levels have grown. Virtually all requests have been met, with delays due to unavailable resources (equipment, personnel or dollars) only being temporary. Until recently this approach, while not desirable, has essentially been effective because of the tremendous increases in the productivity of computers provided by changing technology. Over the long term, this approach means that the total level of information processing activity is the summation of individual requests, without regard to overall State priorities. This philosophy will inevitably lead to the addition of systems, equipment and personnel as requested -- not necessarily as needed.

Teleprocessing is adding a new and more complex dimension to the growth experienced. This technology allows the user to enter data and make inquiries from a remote location to the host computer. The communications link is ordinarily a telephone line and the equipment (terminals) varies from typewriters to small computers capable of doing some processing independent of the host computer (i.e., distributive processing).

There are presently 87 terminals installed in Helena and 111 terminals installed throughout the State that access the host computers in Helena. This does not include the 229 terminals attached to the host computers in the University System. Nearly all are dependent upon telephone lines for connection to the host computer. The demands for this capability have been extremely high during the past year and are expected to continue. The complexities are best illustrated in Figure 3, which shows the teleprocessing network for the Department of Justice.

It has become increasingly obvious that all requests for information processing services cannot have and should not have the same degree of priority. A method is needed to develop priorities to manage the growth of information processing and at the same time provide better quality and efficiency. Costs are increasing rapidly and if nothing is done, information processing will continue to grow essentially unbounded.

There are also a number of critical issues facing the State of Montana, the resolutions of which have statewide and long-term implications.

1. Security and Privacy -- As the teleprocessing network increases in size and complexity, greater quantities of data will be on-line and available for immediate access. More complex measures will be required to assure confidentially and physical security of the data.

2. Uninterrupted Processing -- There is an increasing need to assure that the equipment is functioning to the highest degree economically feasible. In a teleprocessing network, a large number of employees are dependent upon the computer to provide timely services in order to meet the function of their agency. Some applications, such as law enforcement, even require service 24 hours a day.

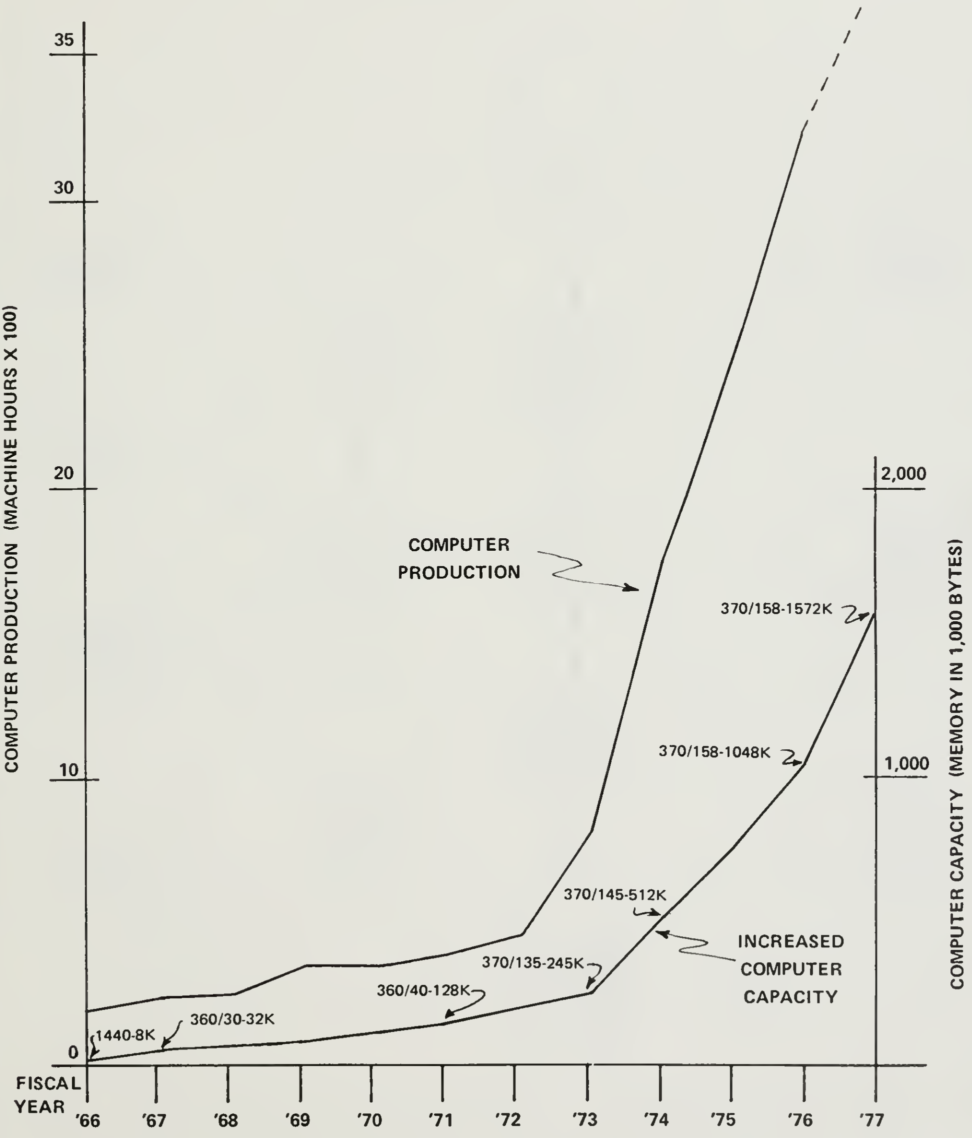
3. Data Base Management -- New data files are continually being developed that have potential use by more than one agency. Agencies often develop files that contain data previously gathered by other agencies. Administration of data bases is badly needed to control and coordinate all files in order to minimize redundancy.

4. Unique Equipment -- Some equipment is frequently only cost justified when used on a statewide basis. Examples: Plotters, computer output microfilm processors and optical character readers. This equipment is expensive. Assuring that the best utilization is made of this equipment, regardless of its location, is difficult.

5. Computer Facilities -- New computer room facilities are needed and are being included in future building construction plans. The cost of proper computer space is substantial as raised floors, air cooling, air humidification, large quantities of power, fire detection, security devices, etc., are required. The possibility of centralizing facilities is being considered since substantial dollar and space savings could be realized.

FIGURE 2

STATE OF MONTANA
DEPARTMENT OF ADMINISTRATION
GROWTH OF DATA PROCESSING



[illegible]

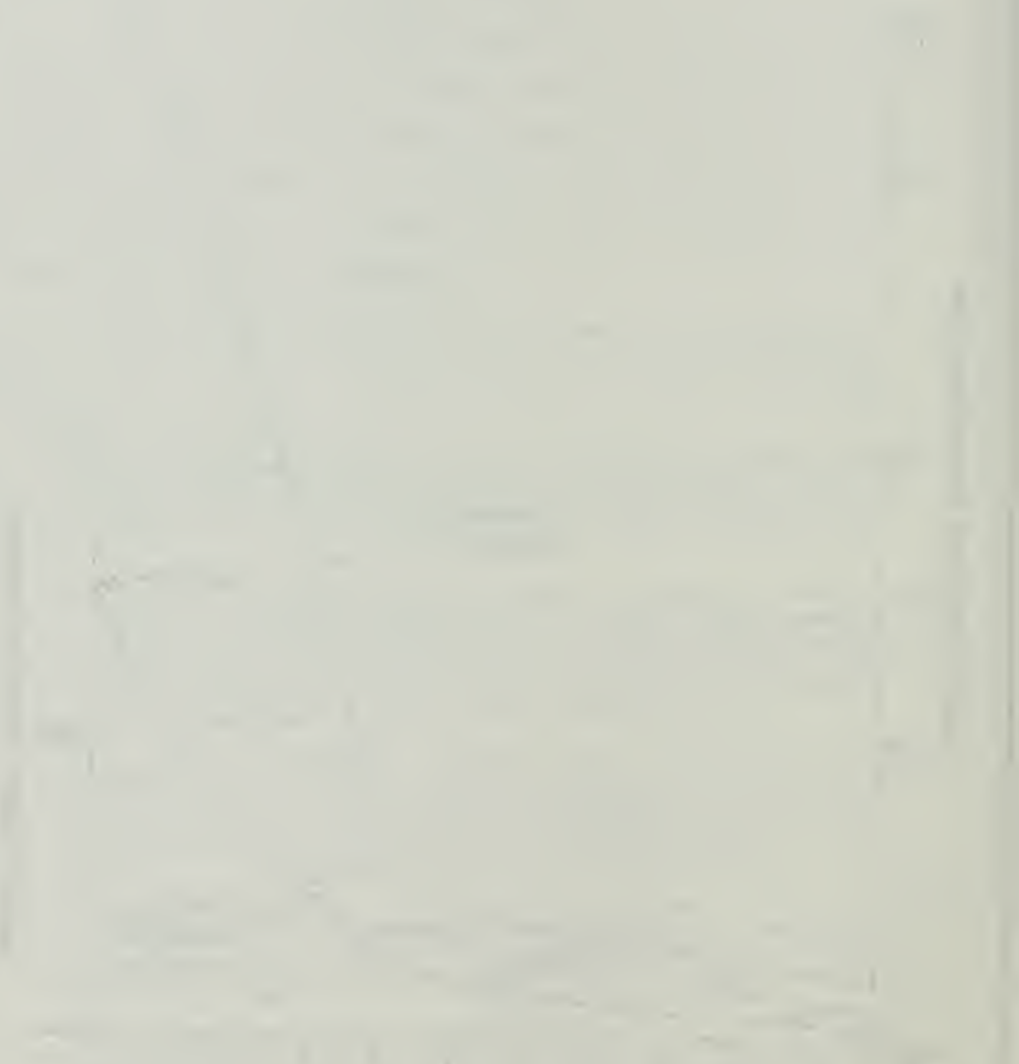
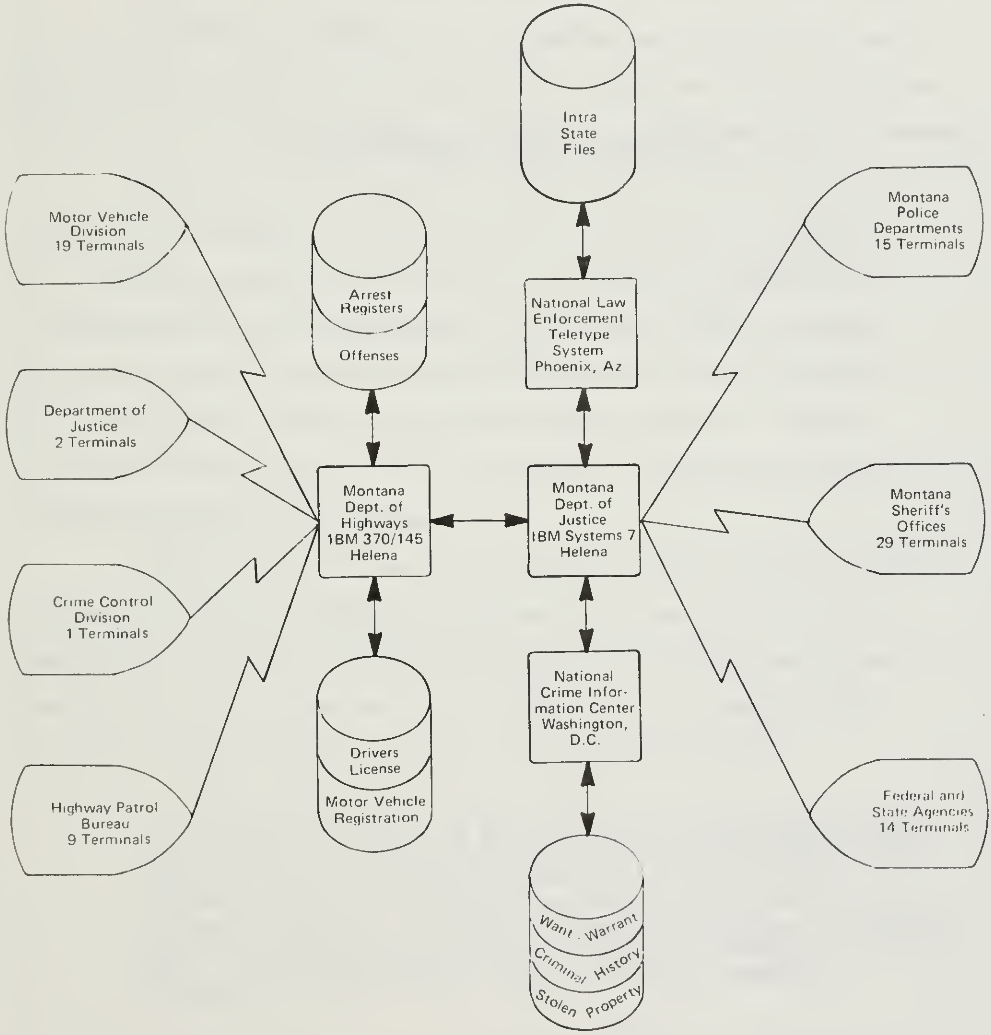


FIGURE 3

DEPARTMENT OF JUSTICE TELEPROCESSING NETWORK


Intra State Files
Motor Vehicle Division 19 Terminals
Arrest Registers
Offenses
National Law Enforcement Teletype System Phoenix, Az
Montana Police Departments 15 Terminals
Department of Justice 2 Terminals
Montana Dept. of Highways IBM 370/145 Helena
Montana Dept. of Justice IBM Systems 7 Helena
Montana Sheriff's Offices 29 Terminals
Crime Control Division 1 Terminals
National Crime Information Center Washington, D.C.
Drivers License
Motor Vehicle Registration
Highway Patrol Bureau 9 Terminals
Federal and State Agencies 14 Terminals
Want - Warrant
Criminal History
Stolen Property

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6. Technical Services -- Qualified personnel to staff a technical services unit, which is essential to keep a complex computer system effectively operating on a day-to-day basis, are hard to recruit and retain and are expensive to train. There must be a provision to assure that technological changes can be accomodated.

Because of the situations outlined above and certain other critical issues, the Department of Administration requested that the Governor issue an executive order to establish a Data Processing Policy Committee to aid in the development of a long-range information processing plan for the State of Montana.

On June 23, 1976, the Governor issued Executive Order 5-76 which directed "...the Department of Administration, in accordance with general policy direction established by the Data Processing Policy Committee, and in cooperation with other departments of the executive branch, to develop and annually update a long-range data processing plan for the fiscal years 1977 through 1981." Further, it was directed that the plan "...provide for the most effective and efficient utilization and coordination of data processing personnel and facilities..."

A key question which had to be addressed by the Department of Administration and the Policy Committee was whether or not the existing policies, organization, assignment of responsibilities and planning and control procedures permitted the above directives to be fully met. The answer was NO! The reasons for this determination are briefly presented below:

1. There exists no mechanism for taking a statewide perspective of information processing (a better term than the more common, but restrictive, term data processing). While the Department of Administration has the authority to approve the type and location of equipment, there is no effective statewide authority over personnel or computer programs. Although an attempt has been made during this planning project to determine total statewide information processing costs, no one presently knows the exact total or expenditure breakdowns.

2. There does not exist a carefully thought out set of policies and guidelines to serve as reference points in the planning process and development of information processing capabilities. There have been some management memoranda issued by the Department of Administration and certain sections of the State Statutes address information processing. These are not comprehensive and in some instances may be inconsistent.

3. The present situation has led to a type of adversary relationship between the Department of Administration and other agencies. The Department frequently finds itself fending off one user against another, or it has to make an "unbiased" decision when, in fact, the decision involves whether or not to approve another agency's request for separate data processing capabilities. Some state agencies accuse the Department of being unresponsive or too expensive.

4. The State of Montana has taken a "bottom-up" perspective in planning for the use of computers and related resources. In its simplest terms, "bottom-up" planning is performed when resources (people, equipment, and systems) are determined by adding up all known requirements. Admittedly, this is an oversimplification of the situation, but clearly a "top down" perspective is needed if the Governor's directive is to be met. In "top down" planning, an attempt is made to determine a rate of growth which is reasonable and attainable, then plan for satisfaction of the requirements using the planned resources. Naturally, growth rates must be modified somewhat by analysis of requirements. But the "top down" concept involves a conscious effort to control the rate of growth and development. The State needs to develop procedures to prepare a biennial plan and provide for continuous planning as needs and priorities change. Such procedures must be consistent with an improved organizational structure and set of policies.

It became clear that before a statewide plan could be completed, it would be necessary to:

1. Insure that key policies and guidelines are examined and redefined as necessary.

2. Insure that clearly defined organizational structures and responsibility assignments are developed and put in place. These must conform with the key policies and guidelines and permit top-level guidance to the processes of planning, executing, and monitoring of the information processing function on a statewide basis.

3. Develop certain procedures, especially those related to priority setting and the biennial planning and continuous planning processes.

In view of this determination and the short time and limited resources available, the Department of Administration suggested to the Data Processing Policy Committee that it would be necessary to limit the scope of the plan to be delivered by the end of December. The Department recommended that the long-range plan be developed in two phases:

Phase I - This would involve a relatively high level review of selected State agencies, and would be completed by December 31, 1976. This phase would address some very fundamental areas, such as how should the statewide information processing function be viewed organizationally and what changes are required before a statewide plan can be implemented.

Phase II- This would involve a detailed review of all State government, and would be completed by December 31, 1977. During this phase key recommendations from Phase I would be implemented, critical issues identified in Phase I studied and recommendations developed and a more detailed, long-term plan prepared.

The Data Processing Policy Committee agreed at their August 30, 1976, meeting that this was the only viable approach to meeting the Governor's directive. Phase I began the last week of September, 1976.

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2.4 Scope and Study Limitations

Phase I scope and objectives were defined as follows:

1. Conduct reviews and evaluations of the various data processing centers and systems groups throughout the State (except for those in the University System as discussed later). The intent was to review areas such as organization, effectiveness of interacting with users of their services and the quality of procedures and standards in place (especially in the systems development area) in order to develop recommendations to improve the organization and execution of the statewide information processing function.

2. Survey selected agencies in order to determine critical, short- and long-term systems development requirements. The intent here was to identify any major problem areas and define the related potential impact in terms of the State's overall information processing and data communications requirements. Although this survey was not designed to lead to preparation of a comprehensive six-year systems development plan (a Phase II task), it has led to definition of a development plan for the most critical tasks facing the State as a whole.

3. Define key policies and objectives for information processing within the state.

4. Define procedures for developing, updating and modifying the long-range plan to reflect changing conditions and priorities. In addition to insuring that an appropriate organizational structure, assignment of information processing related responsibilities, and appropriate standards and procedures are developed, it was recognized that the statewide information processing planning process also needed to be developed. Thus, an important objective of Phase I has been the definition of continuous planning procedures for use during the year as well as special procedures for use during the biennial planning effort.

5. Define the priorities for addressing identified needs considering projects-in-process, the results of the above indicated work and other constraints.

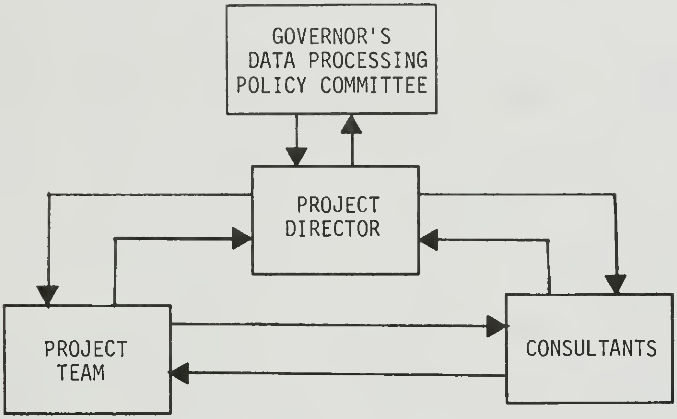
6. Develop recommendations and prepare a written report summarizing the results of Phase I including a program for the completion of Phase II and the identification of key tasks to be completed and/or worked on during the first year of the plan.

Phase I did not include the entire University System within its scope; only their administrative systems were considered. Presently, there is a long-range systems and information processing study for the Montana University System being conducted under the direction of the Office of the Commissioner of Higher Education. It is anticipated that the results of the University System study will be consolidated with the statewide plan during Phase II.

2.5 Study Approach

Figure 4 shows the functional organization of the planning project during Phase I.

FIGURE 4



The functions of the groups were:

1. Governor's Data Processing Policy Committee - This committee had the responsibility for establishing overall planning guidelines, reviewing alternatives, and making recommendations during Phase I of the development of the long-range information processing plan.

2. Project Director - This individual had the responsibility for the overall coordination and supervision of the planning effort.

3. Project Team - This group of individuals were assigned by the various State agencies to assist in the fact finding effort of the planning process. In addition, this group provided a forum for developing alternatives and recommendations to be considered in the planning process.

4. Consultants - An outside firm with considerable experience and expertise in similar studies was engaged to assist the Project Director, Policy Committee and Project Team in completing Phase I and preparing this report.

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CHAPTER 3 ORGANIZATION

3. ORGANIZATION

This chapter is organized into the following sections:

3.1 Introduction
3.2 Organizational Objectives
3.3 Organizational Alternatives
3.4 Assignment of Responsibilities
3.5 Organization Structure
3.6 Policies and Guidelines
Exhibit I Overview of Responsibility Assignments in the Management Cycle
Exhibit II Top Level Responsibility Matrix of Information Processing Functions

3.1 Introduction

During Phase I, the ability of the Department of Administration and other State agencies to support statewide planning and control of the information processing function was evaluated. Generally speaking, the existing organizational structure and assignment of responsibilities does not support a statewide perspective. Without such a perspective, planning and control over this function will remain fragmented. This could permit excessive growth, inefficiencies and duplication of effort and severely limit the ability to prepare a meaningful, statewide plan. This chapter outlines recommended responsibilities and offers several recommendations which are considered essential to meaningful, statewide planning for the use of computers and monitoring the execution of the plan.

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3.2 Organizational Objectives

One of the key objectives of an organizational structure is to provide the basic framework for effective management and operations. Planning, execution and monitoring of the statewide information processing function rely heavily on this framework. Every governmental entity plays an important role. Some entities participate directly, and others participate indirectly by providing feedback on performance, needs, etc. If these entities are to participate in a meaningful manner, the prerequisite is a clear understanding of their respective roles, authorities and responsibilities.

The organizational structure must further sustain these prerequisites by recognizing additional requirements:

1. Provide for flexibility in view of the dynamics of state government.
2. Assign responsibilities consistent with the intent of the Executive Reorganization Act of 1971.
3. Support a visible decision-making process.
4. Provide a forum for debate and review.
5. Provide a "tie-breaker" capability to decide deadlocked issues.
6. Provide for independent analysis and review.
7. Support a "top-down" management perspective.

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3.3 Organizational Alternatives

Several alternatives were considered as potential solutions to the organizational problems. Key alternatives and the main reason for rejection are presented below:

Decentralize All Responsibilities

Each agency could be charged with the responsibility of determining and satisfying its own information processing needs in any manner justified on an individual agency basis. This would undoubtedly result in duplication of effort and excessive costs. Moreover, the State would be unable to address the critical issues discussed in Section 2.3, "Need for a Plan."

Charge the DOA with All Responsibility

All responsibilities relative to planning, monitoring and controlling information processing could be assumed by the Department of Administration (DOA). This would be in addition to functioning as provider of central computer processing and system design services. Since the DOA enjoys equal stature with other agencies, this alternative provides no real "tie-breaker" and the DOA's objectivity would be continuously challenged.

Create a Separate Agency

Some states have considered creating a separate agency to provide information processing services. This approach is very attractive, but deemed difficult to implement. Also, Montana State government is limited to 20 agencies, of which 19 are already assigned. This alternative may justify reconsideration, but the approach recommended appears to be the most practical.

Modify and Thereby Strengthen Current Organization

This is the approach selected and is discussed more extensively in the following sections of this chapter.

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3.4 Assignment of Responsibilities

The main thrust of the organizational recommendations presented below is to create and maintain a statewide perspective in the management of the information processing function. This can be accomplished in the current organizational structure by strengthening, clarifying, and formalizing roles and responsibilities to reinforce such perspective.

The recommendations recognize the intent of the Executive Reorganization Act, yet fulfill the organizational objectives set forth earlier in this chapter. In addition, the approach will ease the transition process since it minimizes the severity of change and legislative action required.

The responsibility matrices presented as Exhibits I and II to this chapter are abbreviated ways of describing the role and State entity responsible for each of the functions indicated.

Exhibit I presents an overview of responsibility assignments in the statewide management cycle of setting policy, planning, execution and monitoring performance. The organizational units in Exhibit I are as follows:

1. Governor -- The Governor of the State or his designee.

2. Montana Data Processing Advisory Committee (MODPAC) -- A high-level committee comprised of members representing the various functions of government. It is chaired by the individual responsible for the information processing program from the Office of Budget and Program Planning.

3. Office of Budget and Program Planning (OBPP) -- The entity within the Governor's Office responsible for planning, preparing and administering the state budget, specifically as it relates to the information processing function.

4. Department of Administration (DOA) -- The Director of the central services agency which is a primary provider of information processing services for the State and those people who report to him.

5. User Departments -- Those governmental entities requiring information processing services.

6. Legislature -- The representatives of the Legislature charged with monitoring fiscal affairs such as the Office of the Legislative Fiscal Analyst and the Office of the Legislative Auditor.

Exhibit II assigns key functions in greater detail than Exhibit I and includes responsibilities for the following subgroups:

7. User DP Services -- Personnel assigned responsibility for performing DP-related functions in various agencies. Users may be classified into three basic types:

Type A: Utilizes statewide computing resources, but no hardware devices related to that usage. This user type typically has no systems development personnel.

Type B: Utilizes statewide computing resources and employs input/output devices to communicate with the central resource. There is no local computing capability. This user type may have internal systems development personnel, when economically justified.

Type C: Utilizes local computing capabilities to maintain some local files for legal, security or reasons of processing efficiency. Local computing resources may be tied to the statewide resource. This user possesses systems development personnel to maintain local systems. Current Type C users include:

- The Department of Administration (as a local and statewide resource)
- The Department of Highways
- The Superintendent of Public Instruction
- The Montana University System

8. Project Team -- The personnel who perform computer systems development project work. The team members usually come from systems development groups and/or the user departments.

9. Steering Committee -- Major systems development projects may warrant a steering committee to guide the team's efforts. This committee would be composed of management from the user department(s) most affected by the project, the project manager and management from the systems development groups and data center involved in the project.

The responsibility matrix shown in Exhibit II is broken into five major sections, briefly described below:

1. The top-level management section describes those activities which insure that the State is provided with productive information processing services. Its primary functions are policy-making, planning and monitoring. This description assumes that there is

day-to-day management of project, operation and support functions by middle managers.

2. The new systems development section describes the functions which must be performed at the management level to insure proper progress on a project from initiation through implementation. The responsibility matrix highlights the management aspects of this area.

3. The section on maintaining and modifying systems involves correcting problems and adding minor improvements to present systems. The function is one of insuring that all computer program problems or required enhancements are identified and promptly corrected or implemented.

4. The section on technical support includes Technical Services Bureau activities required to insure quality and improve the productivity of analysts, programmers and computer operations.

5. All activities that affect operations, beginning with creation of source documents and ending with production of output reports and correction of errors, have been included.

The codes which appear in the matrix describe the type of activity an organizational unit performs. The code appears only if the activity is expected to be significant. The Doer (D) is the organizational entity which is responsible for performing the staff work associated with the function. In many cases, the doer will be assisted by other entities in performing the task. The Contributor (C) is the unit that actively helps with performance of the function. The Reviewer (R) is an organizational unit that makes suggestions to improve the quality of the work performed; it may also recommend that the work be approved or disapproved. The Approver (A) has the final responsibility for approving the product of that function (which usually initiates more action). Disapproval may mean putting off future action, combining it with other activities, projects or operations, or requesting further analysis or justification. If the reviewer is the Department of Administration and no approver is specifically identified, then the review function carries an implied approval responsibility.

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3.5 Organizational Structure

The State of Montana presently has the basic organizational structure required to perform the functions summarized in Exhibits I and II. Some of the responsibilities are formally assigned, while others are being exercised informally. It is recommended that certain responsibilities be redefined, realigned or clarified to support the statewide long-range planning process. Figure 5 depicts a recommended structure for statewide management of the data processing function.

The transition to the recommended organizational structure is a high-priority, Phase II task and must be made carefully. It should be closely coordinated with the implementation of revised management practices (discussed here and in Chapters 4 and 5) to be successful.

Key recommendations relative to major responsibility assignments and management practices are set forth below.

> Recommendation No. 1 -- Create an information processing program to assist in administering this function on a statewide basis.

A "program" for statewide information processing should be established to accumulate and summarize budgetary and expenditure data on a statewide basis. This program will facilitate the establishment of an overall limit, or maximum, on the total resources committed to the function during a specific budgetary period. Service levels, priorities to be addressed, etc. must then fall within the overall limit specified. This provides a means for monitoring services against resources committed, for controlling changes and, especially, for controlling additions to the resource level.

> Recommendation No. 2 -- Biennial justification of dedicated agency resources should be required.

Certain agencies (Type B and C users) may justify the need for dedicated data processing resources. These resources may represent systems development personnel (Type B users) or systems development and operations personnel together with an in-house computer used by the agency (Type C users). In conjunction with each biennial planning cycle, agencies should be required to re-justify the resources assigned to them. If there is no justification or the resources are not addressing priorities specified in the plan, the OBPP may direct that the resources revert to the central authority (DOA) for reallocation according to the priority assignment scheme as discussed in Chapter 4 (Section 4.5). To the extent that a reallocation is not feasible, the agency should be limited to the current resource level for future planning purposes.

Recommendation No. 3 -- Formally assign certain statewide information processing responsibilities to the Office of Budget and Program Planning.

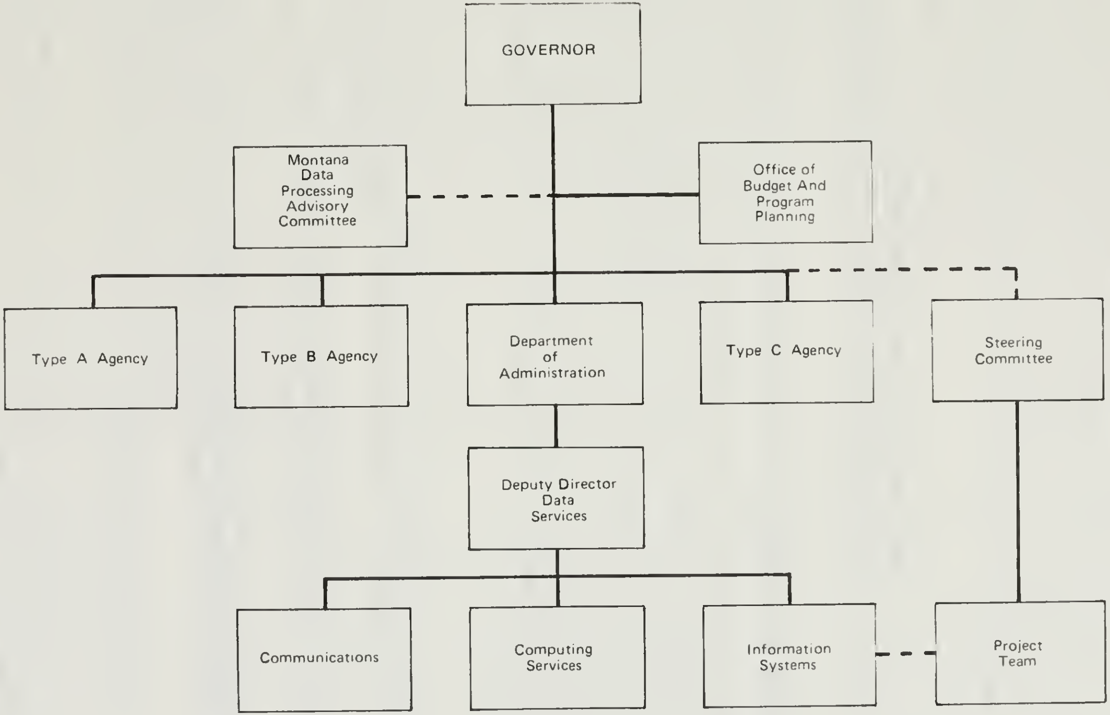
The State should formally identify an individual within the OBPP to perform the responsibilities identified to the OBPP in Exhibits I and II. This position should be at the program manager or Deputy Director level. The individual should be management-oriented, have a broad understanding of State government and a working knowledge of information processing management, systems development, program maintenance and data center operations.

Specifically, the individual would perform the following functions:

1. Assist in the development of statewide policies and guidelines.
2. Act as the tie-breaker if agencies reach an impasse over priorities, needs or direction.
3. Chair the MODPAC.
4. Approve priorities assigned to development projects.
5. Coordinate the statewide information processing "program" and approve changes thereto.
6. Approve the addition of information processing positions based upon the needs reflected in the plan.

FIGURE 5

STATE OF MONTANA
LONG-RANGE DATA PROCESSING PLAN
CONCEPTUAL ORGANIZATION STRUCTURE


GOVERNOR
Montana Data Processing Advisory Committee
Office of Budget And Program Planning
Type A Agency
Type B Agency
Department of Administration
Type C Agency
Steering Committee
Deputy Director Data Services
Communications
Computing Services
Information Systems
Project Team

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7. Approve the procurement and location of information processing equipment (currently a function performed by the DOA).

By assigning these functions to the OBPP, control over all facets of the information processing function is achieved. This is essential to statewide planning, execution and control of the function. To be effective, the individual performing the function must have the support of the Governor and the confidence of the agencies.

Recommendation No. 4 -- Extend Executive Order 5-76 to create a committee to function as a viable advisory body.

A high-level advisory committee comprised of members from the principal functions of government should be established to assist the DOA and the OBPP in planning and monitoring the statewide information processing function. The committee should be chaired by the OBPP individual responsible for the information processing program and include the individual from the Department of Administration responsible for administering the central information processing resource.

The functions of the committee would be to:

1. Advise and make recommendations on policy matters, guidelines and major decisions.

2. Provide a formal communications link between users, the DOA and the OBPP on information processing matters.

3. Participate in the long-range planning process by reviewing plans, major systems proposals and top-level monitoring reports and developing recommendations on improvements in the quality and comprehensiveness of these items.

4. Review post implementation reviews of costs and benefits.

The committee plays an important role in statewide planning by providing the forum for query, investigation and recommendation development and by giving visibility to the decision-making process. Its recommendations should be formally documented and presented to the members and the Governor.

Recommendation No. 5 -- Strengthen and formalize the responsibilities of the Department of Administration (DOA).

The DOA should continue to function as the provider of central information processing resources, and it should be formally recognized as the central planning and coordinating agency for the statewide information processing function.

Within the DOA, responsibility for managing this function should be assigned to an individual at the Deputy Director level. Although the organization of the activities reporting to this individual should be determined by the Director, a suggested structure is presented in the organization chart (Figure 5). It is recommended that the separate functions of Management Systems Division (insofar as they relate to systems development) and the Systems Development Bureau be combined into a single entity identified in Figure 5 as the Information Systems Division.

Specific functions to be performed by the Department of Administration would include the following:

1. Develop and maintain a central information processing resource for use by various agencies. This includes computing, systems development and maintenance and consulting capabilities. A pool of highly technical specialists should also be included.

2. Develop and maintain statewide standards and procedures for feasibility studies, systems design, systems development and operations documentation. Type B and C users should be required to adhere to these standards and procedures for their development projects.

3. Develop a formal training program to maintain and improve technical and management skills of systems development personnel. Training should be provided to all agencies. There should also be a top management training program to familiarize agencies with central data processing capabilities, services, etc.

4. Recommend statewide policies and guidelines to direct the information processing function.

5. Assume a central role in the long-range planning process to include coordinating, compiling and publishing the plan; and, subsequently continue this role in maintaining the plan via the biennial and continuous planning processes described in Chapter 4.

6. Prepare monitoring reports on operations and systems development projects to facilitate monitoring of the execution of the plan by the MODPAC and OBPP. Type C users should coordinate with the DOA in preparing their monitoring reports.

7. Assign priorities to systems development projects utilizing DOA resources, in conjunction with the requesting agency.

8. Conduct post implementation reviews of costs and benefits of systems implemented in conjunction with the user agency and, for critical systems, in conjunction with the Legislative Auditor.

9. Review equipment procurement and location requests for compliance with the statewide plan and make recommendations to the OBPP thereon.

10. Plan for and coordinate the statewide data communications needs.

Recommendation No. 6 -- Priority setting should be performed by the user agency and computing resources impacted.

The detail, long-range plan (a product of Phase II) will reflect the priorities and resources assigned to the needs recognized by the plan. At a minimum the plan should be updated biennially. The priority assigned to a particular need should be jointly developed by the user agency identifying the need and the management of the resource responding to the need, using the priority setting mechanism discussed in Chapter 4. For example:

1. Type A users who rely on the DOA to provide the development resources coordinate priority assignment with the DOA.

2. Type B users with internal systems development personnel assign their own priorities, but coordinate development priorities with the provider of computing resources.

3. Type C users, with both development and computing resources, assign priorities internally for projects impacting only that resource.

This priority setting is subject to approval by the OBPP. However, the approach permits users to plan for needs with a minimum of coordination and will facilitate the biennial planning cycle. See Section 4.5 for additional details.

Recommendation No. 7 -- The State should formally define the responsibilities of the various entities in satisfying the State's information processing requirements.

Exhibits I and II of this chapter summarize the major responsibilities. These should be expanded, formalized and published. Where required, Legislative action should be initiated to amend the statutes for revised roles and responsibilities.

Recommendation No. 8 -- The State should formalize policies and guidelines for satisfying information processing requirements.

Section 3.6 presents some recommendations and comments in this area.

3.6 Policies and Guidelines

Policies and guidelines serve as reference points for planning and decision-making. This section presents some recommendations and suggestions in this area, although it should not be viewed as all-inclusive.

Key Policy Statements

Eight basic policy statements were formulated during Phase I of the long-range plan and submitted to the Data Processing Policy Committee. They are:

1. The overall goal of the Statewide Information Processing Program is to continually strive to effectively and economically provide available technology and information processing resources, regardless of the branch of government or source of funding involved, and thereby assist in meeting statewide policies and programs.

2. A long-range plan for the Statewide Information Processing Program is to be developed and implemented in order to control the direction and efforts devoted to this program. The plan will be revised at least biennially but will also provide for continuous updating based upon identified needs and changes in priorities. The Department of Administration shall have overall responsibility for preparation and updating of this plan.

3. The Department of Administration shall develop, distribute and maintain statewide standards and procedures for the systems development process and information processing operations. Each agency is ultimately responsible for insuring that these standards are observed and implemented, wherever applicable.

4. All data processing systems, within the State, should be designed and operated to insure the individual privacy and security of data and to comply with all statutory requirements.

5. In order to facilitate future expansion of information processing and provide for maximum flexibility in the use of equipment, future equipment acquisitions must be compatible with existing equipment. This does not imply that purchases be restricted to a single manufacturer. To facilitate this, the Department of Administration shall oversee the procurement and location of all information processing and data communications equipment and make recommendations thereon to the Office of Budget and Program Planning.

6. The source of funding for information processing and systems development efforts should not dictate the direction of development nor should it be the sole source for justification.

7. There should be an emphasis on shared, statewide applications in favor of applications developed on an individual agency basis. The Department of Administration is responsible for development and implementation of statewide applications. Centralization

of resources is encouraged whenever justifiable and in conformity with the Statewide Information Processing Program's Long-Range Plan.

8. State agencies shall not obtain information processing services from a private non-government service bureau nor provide such services to other agencies without first receiving written approval to do so from the Department of Administration. Under certain circumstances it may be necessary or highly desirable to do so. In such circumstances, the agency should seek the guidance and assistance of the Department in evaluating the proposal.

General Guidelines

The following general guidelines have been formulated to support a statewide perspective in the planning process. It is suggested that these be evaluated during Phase II of the planning process.

1. A general indicator should be established for use as an overall guide as to the anticipated level of total dollar resources to be allocated to the information processing function (say, x% of total budget) for the State as a whole.

2. All agencies may warrant, at a minimum, a coordinator for information processing. The coordinator is responsible for researching and communicating agency information processing needs, coordinating information processing activity, participating in development projects, etc. In addition, for Type B and C users, systems analysts may be employed to design applications and coordinate with the central programming resource.

3. Systems development projects should be established and monitored by a steering committee. All of the personnel working on a systems development project should report to the project manager and should be assigned on a full-time basis. Maintenance and operations personnel should be clearly separated from this function.

4. The functions of executing and monitoring the statewide plan should be segregated to the extent possible. In effect, the "provider" of resources should not monitor itself.

5. Agencies may justify dedicated equipment to satisfy internal information processing needs. This justification should be limited to a single agency's needs when possible. There is a current trend toward the joint use of shared data on a functional basis (i.e., distributive network by functional area of government) and the State should consider this possibility in responding to the increasing demand for resources.

EXHIBIT I

STATE OF MONTANA

OVERVIEW OF RESPONSIBILITY ASSIGNMENTS IN THE MANAGEMENT CYCLE FOR STATEWIDE INFORMATION PROCESSING

Functional Areas / Organizational Units	POLICY		PLANNING				EXECUTION						MONITORING		
	Set Policy & Develop Guidelines	Act As Final Decision Maker	Set Information Processing Budget	Set Development Priorities	Prepare Biennial & Six Year Plans	Modify Plans And Budget	Use Outside Resources	Systems Development				Maintain And Modify Systems	Systems Audits And Reviews	Systems Development & Operations	External Audit-Management Reviews
								Prepare Proposals	Design Systems	Implement Systems	Operate Systems				
Governor	A	A	A		A										
MODPAC	R	R	R	R	R	R	R	R					R	R	R
OBPP	C/A	D	D	A	C	A	A								
DOA	D	C	C	D	D	D	D	D/C	R/D	R/D	D	D	D/C	D/C	C
User Management	C	C	C	D/C	D/C	D/C	D/C	D/C	D	D	D/C	D/C	D/C	D/C	C
Legislature	C	C	A						C				D		C

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EXHIBIT II

STATE OF MONTANA
TOP LEVEL RESPONSIBILITY MATRIX OF INFORMATION PROCESSING FUNCTIONS

FUNCTIONS	Governor	MODPAC	OBPP	User Management	User DP Services	DOA	Project Team
A. Top Level Management							
1. Set Policy and Guidelines							
(a) The approach to satisfying the State's Data Processing requirements	A	R	C/A			D	
(b) The procedures for setting priorities		R	D			C	
(c) The allocation of State resources to Data Processing		R	A	C	D	D	
2. Update the six year plan and multiyear budget forecast for Information Processing function in view of short and long range State goals.							
(a) Forecast Operations & Maintenance effort and productivity increases		R	R	C	D/C	D	
(b) Size the potential and continuing development efforts		R		C	D/C	D	
(c) Assign priorities		R	A	D/C	D/C	D/C	
(d) Set preliminary DP budget forecast		R	D	C	C	C	
(e) Perform iterative process of time phasing the satisfaction of identified requirements in view of available resources		R		C	D	D	

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EXHIBIT II

STATE OF MONTANA
TOP LEVEL RESPONSIBILITY MATRIX OF INFORMATION PROCESSING FUNCTIONS

FUNCTIONS	Governor	MODPAC	OBPP	User Management	User DP Services	DOA	Project Team
3. Update the plan for equipment.		R	R/A	C	D/C	D	
4. Update the plan for personnel.		R	R/A	C	D/C	D	
5. Publish six-year plan	A	R	R/A	C		D	
6. Modify the plan and budget		R	A		D/C	D	
7. Execute the plan		R	R	D	D	D	
8. Top management monitoring of DP activities							
(a) Systems development project performance		R			C	D	
(b) Operations and equipment utilization		R			C	D	
9. Act as "tie-breaker" - final decision maker	A		D	C		C	
10. Use of outside resources							
(a) Enter into contracts with outside suppliers of DP services		R	A	D/C		D	
(b) Prepare and submit grant requests		R	A	D/C		D	
B. New Systems Development							
1. Analyze department operations and identify areas for systems improvement				A	D	D/C	

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EXHIBIT II

STATE OF MONTANA
TOP LEVEL RESPONSIBILITY MATRIX OF INFORMATION PROCESSING FUNCTIONS

FUNCTIONS	Governor	MODPAC	OBPP	User Management	User DP Services	DOA	Project Team
B. 2. Prepare new systems proposal							
(a) Prepare system request				A	D	C/D	
(b) Screen request against interdepartmental guidelines, and approve scope for proposal development				D	C	D/C	
(c) Organize the project team				D	C	D	
(d) Manage the project:							
1) Ultimate responsibility				D		C	
2) Day-to-day responsibility							D
(e) Perform the work required to define feasibility study to include benefits, costs and control requirements						D/C	D
(f) Approve/disapprove recommendations		R	A	D			
(g) Review priority for detail systems design		R	A	D/C		D/C	
3. Perform detail design and programming							
(a) Organize the project team				C	D/C	D/C	
(b) Manage the project: 1) Ultimate responsibility				D	C	C	

A - Approver C - Contributor D - Doer R - Reviewer

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EXHIBIT II

STATE OF MONTANA
TOP LEVEL RESPONSIBILITY MATRIX OF INFORMATION PROCESSING FUNCTIONS

FUNCTIONS	Governor	MODPAC	OBPP	User Management	User DP Services	DOA	Project Team
2) Day-to-day responsibility							D
(c) Perform the work required to include preparation of run specifications and procedures, programming and testing							D
(d) Plan the systems test and conversion				A	C	C	D
4. Perform system test							
(a) Organize the project				C	C	C	D
(b) Manage the project:							
1) Ultimate responsibility				D			
2) Day-to-day responsibility							D
(c) Perform the work required				C	C	C	D
(d) Evaluate test results				D		C	C
(e) Approve/disapprove results				D	C	C	
5. Implement							
(a) Organize the project				C	C	C	D
(b) Manage the project:							
1) Ultimate responsibility				D			
2) Day-to-day responsibility							D

A - Approver C - Contributor D - Doer R - Reviewer

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EXHIBIT II

STATE OF MONTANA
TOP LEVEL RESPONSIBILITY MATRIX OF INFORMATION PROCESSING FUNCTIONS

FUNCTIONS	Governor	MODPAC	OBPP	User Management	User DP Services	DOA	Project Team
(c) Convert to new system				C		C	D
(d) Monitor system performance						C	D
(e) Final acceptance of system				A	D		C
6. Post-implementation reviews of costs and benefits (NOTE)		R		C		C	C
C. Maintaining and modifying systems							
1. Identify need for change				A	D/C	D/C	
2. Design the changes				A	D/C	D/C	
3. Make the changes					D/C	D	
4. Perform the system test							
(a) Review the modified system for adherence to system design and programming standards and evaluate test results					D	D	
(b) Approve/disapprove recommendations to convert				D	C	C	

NOTE: The Legislative Auditor, user and project team jointly perform this task.

A - Approver C - Contributor D - Doer R - Reviewer

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EXHIBIT II

STATE OF MONTANA
TOP LEVEL RESPONSIBILITY MATRIX OF INFORMATION PROCESSING FUNCTIONS

FUNCTIONS	Governor	MODPAC	OBPP	User Management	User DP Services	DOA	Project Team
5. Convert							
(a) Monitor system performance					D	D/C	
(b) Accept modified system				D			
D. Technical Support						D	
E. Operating existing systems				C	D	D	

A - Approver   C - Contributor   D - Doer   R - Reviewer

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CHAPTER 4

PLANNING AND CONTROLLING STATEWIDE INFORMATION PROCESSING RESOURCES

4. PLANNING AND CONTROLLING STATEWIDE INFORMATION PROCESSING RESOURCES

This chapter is organized as follows:

4.1 Introduction

4.2 Biennial Planning Process

4.3 Continuous Planning Process

4.4 Systems Development Project Planning and Control

4.5 A Mechanism to Set Priorities

4.6 Relating the Planning Processes to the Statewide Organizational Structure

Exhibit III Biennial Planning Process

Exhibit IV Continuous Planning Process

Exhibit V Priority Setting for System Development Projects

4.1 Introduction

This chapter discusses a process for statewide planning and control of information processing. The recommended process has four major objectives:

1. Provide a formal analysis of the State's information processing resources required to sustain present applications and future system development capability. This analysis occurs biennially and results in the identification of resources the State can expect to have available over a planning horizon of six years.

2. Publish biennially a six-year plan for use of present resources and for the addition or reduction of resources as required.

3. Provide a methodology for continuous planning, where continuous planning is defined as that which occurs throughout the biennial period, between published six-year plans.

4. Provide a formal methodology for computer system development including a priority assignment and decision making process which is consistent with the biennial and continuous planning processes.

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4.2 Biennial Planning Process

This section discusses the biennial planning process as shown in Exhibit III. The process assumes that an initial plan exists. The purpose of the Statewide long-range planning project is to develop this initial plan. The reader is referred to Chapter 6 - "Requirements for Phase II in the Development of Initial Detail Plan." Once the initial detail six-year information processing plan has been developed, it will be updated biennially by the process described below.

There are four major phases to the biennial planning process. The first phase is the biennial priority assignment function. The second phase consists of preparation of a statewide information processing expenditure plan. The third phase is the preparation of a detailed systems development plan and associated equipment and personnel plans. This phase results in a six-year information processing plan. The fourth phase is the continuous planning and control process which is discussed in the next section.

Biennial Priority Assignment

The methodology for assigning priorities to proposed system development projects is essentially the same for both the biennial and the continuous planning processes. This methodology is described in detail in Section 4.5.

The purpose of the biennial priority assignment step is to permit agencies to formally analyze and update their information needs for inclusion in the six-year information processing plan. Most feasibility study reports will be recognized as part of the continuous planning process described in Section 4.3. Biennially, outstanding feasibility study reports should be completed and a priority assigned. Previously approved and prioritized feasibility study reports and on-going projects should also be re-evaluated.

After all priorities have been assigned, a master list of approved and prioritized projects is prepared. This list should be distributed before the biennial six-year information processing plan is prepared for a "hearing" before the MODPAC on disagreed items. Final priority is then assigned after the "hearing," but not before decisions to change the State's resource mix or go outside for information processing services have been made and approved by the Office of Budget and Program Planning. This evaluation and decision process is discussed later in this section.

Develop Tentative Statewide Information Processing Expenditures Plan for Next Six Years

While the biennial priority assignment function is under way, another phase of the biennial planning process should be in process. This is development of a revised top-level expenditure plan for the next six years. This plan is expressed in dollars as a meaningful common denominator of people, equipment and other resources. The tentative plan should be completed and then reviewed by the individual in the OBPP responsible for coordination of the State's long-range plan for information processing. The tentative plan should be analyzed and revised as necessary as the systems development, computer equipment and personnel long-range plans are finalized.

Preparation of the tentative six-year expenditure plan requires input from several sources:

1. The current six-year expenditure plan.
2. The latest updated systems development plan.
3. New development and maintenance requirements from the agencies which have or are going through the biennial priority assignment function described in the preceding section.
4. Utilization reports on people and equipment.

Exhibit III at the end of the section indicates the general flow and timing of the biennial planning process. This diagram should be folded out for ease of reference while reading this section.

Preparation of the tentative, revised expenditure plan consists of six steps which are presented below. The methodology summarized in these six steps assumes that a six-year information processing plan, including a six-year expenditure plan, already exists. Thus, the essence of the approach is first, to contrast the current year of the present plan with approximately 12-18 months of experience in executing the plan; second, to re-examine the years three through six (which will be years one through four of the new plan); and third, to estimate expenditures for years five and six of the new plan.

1. Analyze present level of expenditures (which should be as of 12-18 months into the current budget period) and compare them with the current period's statewide expenditure plan (see Figure 6). The analysis of the present level of expenditures is simply a high level comparison of period-to-date expenditures and resource utilization against the first biennial period of the current plan to suggest areas for special consideration in the following work steps. For example, if maintenance is running ahead of the current plan, this may mean that the standing assumptions and guidelines used in estimating maintenance expenditures should be changed. Based on this analysis, current period figures from the six-year expenditure plan should be adjusted. These adjusted figures become the present levels in the new six-year plan.

The purpose of the next several work steps is to analyze and adjust, as deemed necessary, the annual growth rates for the years three through six of the current, statewide expenditure plan. These become years one through four of the tentative expenditure plan for the next six years. An additional task is then to estimate amounts to be available in years five and six.

2. Examine the growth rate of administration. Growth in this area should lag the rates established for operations and maintenance. This is because of the high fixed cost characteristics of this function.

3. Examine the annual growth rate of the data preparation and conversion and computer operations areas. An historical average growth is usually a fairly stable indicator in these functions for large computer users such as the State. Significant changes in transaction volumes and planned hardware modifications will also affect the growth percentage. In other words, questions of the following sort must be answered and reflected: What has been the growth rate for the last several years and is it likely to continue? What will be the impact of new systems currently under development? What changes in transaction volumes are expected?

What will be the effect of planned hardware and software changes?

4. Examine the growth rate for program maintenance. Generally, this will follow the growth rate for data conversion and computer operations. Special consideration should be given to the installation of new systems and the replacement of older programs. The former could increase maintenance requirements, the latter should reduce them.

5. Examine the growth rate for system development. In evaluating the reasonableness of the systems development growth rate, questions of the following sort must be answered. Is the total resource manageable given the current personnel and organization? Do the resources permitted with the planned level of expenditures satisfy the pent-up demand for new systems development within a reasonable period of time?

At this point in the process of preparing a tentative six-year projection of statewide information processing expenditures, there has been an examination of the growth in all functions. In other words, the validity of previous estimates to meet current and planned computer applications have been re-examined in view of 12-18 months of additional experience.

The final step is to complete the plan as to the amount of money to be expended for each function.

6. Complete a tentative six-year growth projection for information processing expenditures. This is accomplished by extending the present resources as determined in Step 1 by the growth rate percentages as determined in Steps 2 through 5. The resulting dollars must be reviewed for reasonableness. Sometimes an historical rule of thumb can be useful here; for example, total systems development resources should not exceed X percent of total net operational resources. This re-examination and analysis process is closely tied to steps described in the next phase "Prepare the Biennial Six-Year Information Processing Plan." The dollars should be adjusted as necessary with an appropriate adjustment in growth rate.

It is important to perform the above-described processes associated with developing a dollarized, top-level expenditure plan. Doing so will permit the State to take a "top-down" perspective in planning for the use of computers. This is in contrast to a "bottom-up" perspective. Naturally, the growth rates are modified somewhat by analysis of the requirements, but the "top-down" concept involves a conscious effort to dictate a rate of growth and development.

STATE OF MONTANA
SIX-YEAR, STATEWIDE INFORMATION PROCESSING EXPENDITURE PLAN
(THOUSANDS OF DOLLARS)

	PRESENT RESOURCES					ANNUAL GROWTH (%)						SIX-YEAR PLAN					
GENERAL STATE GOVERNMENT	PER-SONNEL	EQUIP-MENT	OTHER COSTS	OUTSIDE SERVICES	TOTAL	1	2	3	4	5	6	1	2	3	4	5	6
Administration	383	21	5	50	459	4.0	4.5	4.7	5.0	5.2	5.1	477	498	522	543	576	605
Data Prep & Conversion																	
Operations																	
Maintenance																	
Development																	
SUB-TOTAL	4,229	1,286	257	95	5,867												
UNIVERSITY SYSTEM																	
Administration																	
Data Prep & Conversion																	
Operations																	
Maintenance																	
Development																	
SUB-TOTAL																	
TOTAL STATEWIDE																	
Administration																	
Data Prep & Conversion																	
Operations																	
Maintenance																	
Development																	
TOTAL																	

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Prepare the Biennial Six-Year Information Processing Plan

The last phase of the biennial planning process is the preparation of a new six-year information processing plan. At this point in the biennial cycle:

1. A tentative, six-year, statewide expenditure plan which assigned dollar levels to the functional areas of administration, data preparation and conversion, computer operations, system maintenance and system development has been prepared. This process has emphasized a "top-down" view of the information processing function and has evaluated the projected resources in light of such questions as: Is the statewide information processing program manageable given the current personnel and organization?

2. The biennial priority assigning function is complete and priorities for planned system projects have been re-evaluated and new projects have been assigned priorities.

The new six-year information processing plan will include a system development plan, an equipment plan, a personnel plan and a final six-year expenditure plan.

1. Systems Development Plan -- This step emphasizes a "bottom-up" view of the planning processing and will result in a meshing of the tentative expenditure plan with high-priority development needs into a long-range systems development plan.

   There are five elements in putting together the systems development plan. First is translation of the dollarized resource into units of measure which will permit allocation of the resource to agencies and projects within agencies. Second is the determination of the net available systems development resources. Third is the assignment of resources to the approved projects. Fourth is the analysis of the assignment as it affects each of the various agencies. Fifth is the analysis of the plan as it affects equipment and personnel plans and the magnitude of the other information processing resources, such as maintenance.

   Man-months is the conventional unit of measure used to schedule systems projects. Translation from the expenditure plan is straightforward. This is because the makeup of the current period's development resource is known. It is made up of W number of analysts and X number of programmers plus Y number of dollars (for effort to be provided from outside the State) spread across Z agencies. Thus, the development resource can be expressed as available man-months of in-house analysts and programmers and outside effort. The outside effort is usually viewed as simply available and categorized as analyst or programmer man-months during the process of scheduling projects.

After translation into man-months, the tentative systems development resource must be adjusted to determine net available in-house analyst and programmer resources. This is done by taking certain deductions:

a. Other nonproject resources -- This represents time not chargeable to system development projects such as vacation, holiday and training time. This should also include time for on-going agency surveys to determine immediate or future needs.

b. Feasibility Studies -- This represents time allocated to defining projects to be included in the development plan. Enough resources must be allocated here to allow proper studies to be conducted so management can make informed decisions in approving/disapproving projects and in setting priorities.

c. Contingency -- This represents resources which are held in reserve for unanticipated demands. The use of the contingency pool will aid the State in maintaining sufficient resources to undertake emergency work. It will also make allowances for system maintenance and other uncertainties which always seem to occur. Typically, this reserve depends on the time period involved. The contingency pool will be small in the first year of the plan, then increase in years two through six. For example, in the first half of year one there might be very little contingency, in the second half of year one there might be 10 percent, in year two there might be 20 percent, etc.

d. Turnover -- A factor is used to reflect turnover. In other words, at any point in time, X number of positions will be in the process of being filled.

It is now possible to schedule use of the planned development resources to the development projects. The following are some basic considerations regarding the scheduling of the projects:

a. System proposal projects should continue through the analysis and preliminary design phase, at which time they are re-evaluated by management and/or the project steering committee to determine if the project should continue.

b. Projects in the installation phase should continue through the implementation phase unless the project steering committee concludes that the system should not be implemented as conceived.

c. Projects should be assigned resources in priority sequence. Since each project is planned to be designed and implemented by a properly organized team over a reasonable time span, any extra available resources which become available should not affect the project's schedule.

d. The scheduling of resources to a project may become complex. After the first few projects have reserved the majority of the resources each month, the remaining resource level may fluctuate significantly month by month thereafter to properly proceed with the project. Since the resources should be fully utilized on some activity, the planning should consider the following alternatives to help insure that projects proceed in priority sequence or as early as possible: (a) schedule the use of the contingency pool, (b) reschedule training time and (c) put off a larger project and start a smaller, lower-priority project in place of the larger one.

Once all resources have been assigned to approved projects it is necessary to analyze and modify the system development plan (changing priority grading if necessary) to insure that there is the proper allocation of resources to the various agencies in the State.

This step of insuring proper allocation of systems development capability (analysts and programmers) to the various agencies and projects is both crucial and difficult. If the assignment of presently available resources (whether from DOA or internal to Type B and C users) to the projects according to the approved priorities results in all high priority projects being scheduled for work early in the plan, and systems development resources throughout the State (regardless of agency in which located) scheduled for full utilization, then, the ideal situation will have been achieved. But, more realistically, some imbalance will be found. Certain agencies should be asked by the OBPP to justify their plans in view of the requirements statewide. Serious consideration must be given to shifting resources between agencies and/or to the DOA. The forum for discussion of these issues is provided by the MODPAC and the OBPP is the decision maker, subject to the Governor's and Legislature's approval.

The products from the steps discussed above and this final analysis are a systems development plan (see Figure 7 for an example) and a master implementation schedule. The master implementation schedule is a bar chart showing all projects with indication of estimated man-months and outside dollars.

2. Equipment Plan -- This plan shows the expected dollar expenditures for equipment over the next six years. Details as to additions or changes are usually planned for only one to three years into the future. This is because of the rapidly changing marketplace for computer equipment and the heavy dependence of the details of the equipment plan on systems growth and new systems development.

Continuous decisions regarding the plan must be made as major new inputs are received. The following must be considered:

a. Present equipment configuration and cost.

b. Present equipment utilization.

c. Systems development plan -- Every feasibility study report and every analysis and preliminary design report should be reviewed. These reports should comment on equipment considerations.

d. Detail design and construction projects -- There should be a liaison with all major projects to determine more precisely the timing and extent of computer loads for program test, systems test, conversion and operation of the new system.

e. Computer vendor announcements -- These must be evaluated as to impact on the equipment plan.

f. Outside processing -- There should be a record maintained on all processing done outside the State. There should be periodic reviews to determine if conditions justify bringing the processing to the Department of Administration or other information processing resource centers such as the Superintendent of Public Instruction.

Input to the equipment plan is heavily dependent upon the continuous planning process. However, it is important to publish an updated plan as a byproduct of the biennial planning process.

3. Personnel Plan -- As with the six-year expenditure plan, it is conceptually useful to identify personnel to the five functional areas of the information processing function: administration, data preparation and conversion, operations, systems maintenance and systems development. Also, as with the systems development and equipment plans, there is an element of iteration between this plan and the statewide expenditure plan. However, the greatest interplay is usually between the personnel plan and the systems development plan.

Preparing personnel plans for administration, data preparation and conversion functions, and operations is relatively straightforward. The easiest is for administration. Growth in data conversion personnel is a function of growth in transaction volumes and new systems installations. The same is generally true in computer operations. However, consideration must be given to the effects of planned equipment changes and the addition or deletion of work shifts.

Systems maintenance requirements are generally easy to handle. However, because the Department of Administration, and other agencies with analyst and programming staffs do not completely separate maintenance staff from system development staff, personnel planning for maintenance becomes a subset of staffing for systems development.

The problem area in personnel planning lies in the systems development function. This is because there is heavy pressure to plan "bottom-up" as opposed to "top-down." This concept was described earlier. At any one point in time, the systems development resource is made up of a mixture of dollars for analysts, programmers and outside assistance. In a well-planned environment, this mix will stay roughly the same and the total resource will not fluctuate greatly from year to year. If it does fluctuate, then a number of questions need to be addressed, such as:

a. Has the plan taken the short-range view, reflecting too much "bottom-up" planning?

b. Is there a substantial backlog of development projects which will support this resource level into the future?

FIGURE 7

STATE OF MONTANA
SYSTEMS DEVELOPMENT PLAN
(THOUSANDS OF DOLLARS)

	YEAR 1 - BY HALVES							
GENERAL STATE GOVERNMENT	1	2	TOTAL	Year 2	Year 3	Year 4	Year 5	Year 6
Gross Development Resources	600	700	1,300	1,500	1,700	1,900	2,100	2,300
Less: Other Non-Projects								
Feasibility Studies								
Contingency (Turnover, etc.)		↓			↓		↓	
TOTAL		↓			↓		↓	
Net Development Resources:		↓			↓		↓	
Dollars		↓			↓		↓	
Analyst Man-Months		↓			↓		↓	
Programmer Man-Months		↓			↓		↓	
Outside Dollars		↓			↓		↓	
UNIVERSITY SYSTEM		↓			↓		↓	
Gross Development Resources		↓			↓		↓	
Less: Other Non-Projects		↓			↓		↓	
Feasibility Studies		↓			↓		↓	
Contingency (Turnover, etc.)		↓			↓		↓	
TOTAL		↓			↓		↓	
Net Development Resources:		↓			↓		↓	
Dollars								
Analyst Man-Months								
Programmer Man-Months								
Outside Dollars								

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c. Has the alternative of temporarily increasing the relative size of the outside development effort to handle unusual peaks been properly considered?

The published personnel plan in the six-year plan usually consists of a schedule which indicates number of people by year, by function, and by agency. Behind this schedule is considerable effort which has considered the delicate interplay of the six-year expenditure level constraints, the system development project plan, training, career development and all the other considerations of personnel planning and development.

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4.3 Continuous Planning Process

This section discusses the continuous planning process (see Exhibit IV) and monitoring actual progress against the plan. There are several reasons for performing continuous planning:

1. The biennial planning process occurs as of a fixed point in time and must of necessity be based upon certain assumptions and available data. There must be a methodology for reacting to changes in assumptions and data.

2. Execution of the plan will result in the need to make new decisions and alter the plan itself. Causes for this are endless; for example, project slippage or changes in project scope as the result of completing the system design phase of a project.

3. New needs will emerge, such as legislated requirements and unanticipated opportunities for outside funding.

The primary objective of continuous planning is to provide an ongoing mechanism for:

1. Identifying, prioritizing and inserting new or changed systems development projects into the systems development plan.

2. Analyzing continuously the effects of changes to the development plan on equipment and personnel plans and making decisions as necessary.

Continuous planning occurs throughout the biennial period. In most respects, the continuous process is similar to the process followed in preparing the biennial plan described in the preceding section. The major differences lie in emphasis and point of view. The emphasis is on the system development plan, the detail assignments of personnel and resources and short-term decisions. The biennial planning process is relatively fixed in time. All resources are reviewed and all known demands on the resources are arranged in order of priority. The effects of growth and new development efforts on equipment and personnel are studied and major budget decisions are made. On the other hand, the continuous planning process is one of shifting available resources, especially personnel, from one development effort to another, and trying to balance the on-going use of resources against new high-priority demands as they are identified. The decision to go inside or outside on particular development efforts becomes more immediate in the continuous planning process.

The very nature of continuous planning increases the difficulty of breaking it into component parts. However, as with the biennial plan, it can be viewed as having three major elements:

1. Updating the Systems Development Plan -- New systems development requests and the completion of system proposal projects will require the Department of Administration to alter the biennial plan with the assistance of the University System, the Office of the Superintendent of Public Instruction (SPI), the Department of Highways and the other general government agencies. Also, the results of execution of the plan will affect the reassignment of resources from one project to another. The same methodology and considerations as defined in the preceding section apply on a continuing basis. It is suggested that a revised systems development master schedule be prepared every six months for the general government (including SPI) and the University System areas and distributed at that time.

2. Updating the Equipment Plan -- Typically the equipment plan for major hardware and software additions and alterations published in the six-year plan need not be formally revised during the biennial period. However, each new development project should be carefully reviewed as to future impact. Utilization reports on computer operations should continuously be monitored and extrapolated into the future and compared with the plan. Decisions on equipment and software changes are typically made during the continuous planning process but, except in unusual circumstances, implementation is after the next biennial planning cycle.

3. Updating the Personnel Plan -- Here again there is usually no need to formally revise the personnel plan, for the emphasis is at a lower level during the period. In other words, the emphasis is on the detail assignment of individuals to projects, training courses, and maintenance efforts at the agency level.

4.4 Systems Development Project Planning and Control

The Department of Administration's Manual of Standards defines the phases for systems development projects to be as follows:

1. Feasibility Study -- A broad scope of objectives is formulated, existing procedures are studied and problems are defined. Potential system configurations are formulated and costs/benefits are analyzed. This stage culminates with a Feasibility Study Report.

2. Analysis and Preliminary Design -- A high-level basic design of the entire system is completed. The end of this phase is marked by the preparation of the System Flowchart and the System Narrative which gives the functional specifications of what the system is to do.

3. Detail Design -- Program definitions are written, file and report layouts are prepared. This phase is complete when all documentation necessary to construct the system has been prepared.

4. Construction -- Programs are written and files are converted. Individual programs are debugged (unit testing) and operational documentation is prepared.

5. System Testing -- Entire job streams are tested with selected data and volume tests are run with live data.

6. Implementation -- Operational documentation is accepted by the Computer Services Bureau and the programs are placed in production. User training is completed and the system is turned over to the user.

7. Operation and Maintenance -- The system is running in a normal operating environment with modifications and enhancements made to the system upon request by the user.

Generally speaking, these phases are correct. However, the Phase I review of systems development groups within the State of Montana revealed that:

1. The details of the steps and tasks within these phases have not been developed, although some of the resulting documentation has been defined.

2. Systems development standards and practices vary widely between agencies and even between analysts within agencies.

3. Estimating guidelines used to predict development effort are incomplete and inconsistent.

4. Project control over effort expended is inadequate.

5. No follow-up is conducted once a system is implemented to assure the original objectives, costs and benefits were realized.

As a result, it is difficult to monitor and control a given systems development project from inception to completion.

It is possible to develop a long-range plan without comprehensive systems development project planning and control mechanisms in place. However, these mechanisms are necessary if the plan is to be effectively implemented and monitored. A recommended approach to systems project management is presented in this section. The approach consists of five components:

1. Definition of a standard approach to the system project planning process.
2. Development of systems design standards.
3. Development of estimating guidelines and procedures for their use.
4. Implementation of a comprehensive project reporting and control system.
5. Implementation of an effectiveness audit program.

Standard Approach to Systems Project Planning

The objectives of the systems development planning process are as follows:

1. To identify the major steps (phases and segments) and their interrelationships in systems development.
2. To define and organize the phases and segments in sufficient detail to insure that each one is comprehensive without duplicating any steps.
3. To minimize and standardize the training effort in developing project managers.
4. To provide a means for better communication between users, systems and development groups, operation center personnel, the Montana Data Processing Advisory Committee and the Office of Budget and Program Planning.

The communication aspect is an important point. When there exists a "road map" for the systems development process which presents the planned sequence of events to be followed, people know what to expect and can relate to what must occur.

The recommended approach to the systems project planning process consists of six phases:

1. Feasibility Study
2. Preliminary design
3. Detail design and construction
4. System testing
5. Implementation
6. Post implementation review of costs and benefits

Each of these phases is discussed in more detail and related to a planning chart in Appendix III, Volume 2.

System Design Standards

System development standards are organized to provide for planning, designing and documenting development, modification and production systems maintenance for computer systems. These standards should provide guidelines for planning project scope, estimating project requirements, developing project work plans and managing the project. In addition, these standards should specify requirements for project review and approval, system design and programming documentation, system controls and interface with other standards.

Technical standards are organized to provide for program design and programming conventions in many disciplines. These standards should provide technical guidelines for system design, program design and programming language conventions. They should also provide information on the use of utility programs, test monitors, data management systems and teleprocessing monitors. Finally, technical standards should serve as a repository for information on operating systems standards, including JCL (Job Control Language) conventions, as well as the available in-house software routines.

One of the policies recommended in Chapter 3 (Section 3.6) pertains to the development of statewide standards and procedures for systems development by the Department of Administration. It is recommended that these be developed to support the development planning cycle described above.

One specific area of systems development in Montana warrants further comment from a design standpoint. Montana has experienced dramatic growth in the use of on-line teleprocessing technology in the State. The increase over the last two years is in the magnitude of 130 terminals, or 700 percent, with an approximate annual equipment cost for this increased usage of $250,000.

The fact that this growth has occurred is not necessarily undesirable. However, it may be an indication of uncontrolled growth that may not be cost justified.

In light of this situation and the likelihood that growth will continue, the systems design standards developed should insure the propriety of on-line applications. The following suggestions are provided:

1. Establish statewide standards and guidelines which address the criteria used to justify the need for implementing new applications on an on-line basis rather than in a batch processing mode.

2. Review, re-evaluate and rejustify current on-line applications to confirm the need.

3. Evaluate the use of "local" mini-computers dedicated to supporting file inquiry where inquiry and memo update are the only requirements. Current technology provides low-cost mini-computers capable of handling large inquiry loads using files created from the central computer application.

Estimating Guidelines

Effective project scheduling and control are dependent upon identifying all elements of a project and accurately estimating the time necessary to complete the work required for each element. The size and complexity of a project and the experience levels of the individuals assigned will have a direct effect on the amount of time required for various segments and tasks in the project.

Standard manpower estimates are required to accurately evaluate the effectiveness of each member of a project team and to develop cost/benefit analyses at the end of the feasibility study and preliminary design phases of project planning (discussed in Appendix III).

The estimates should be based on the recommended planning process and should also reflect the standards developed for systems design. Although estimates for the feasibility study and preliminary design phases of the development process are largely based on judgment and experience, guidelines for these estimates should be developed. The major portion of the work involved in developing a system begins with the detail design of the system. The time required for this effort should be based on predetermined standards.

It is recommended that statewide standards for estimating time be developed for use in statewide systems project planning. The estimates should be derived from historical information and discussions with appropriate management personnel. In some instances, past experience may be insufficient to develop reliable guidelines and temporary estimates will have to be utilized. However, all estimates should be periodically re-evaluated and revised by experienced personnel based upon historical performance.

Project Reporting and Control

Systems project scheduling and reporting on an accurate and timely basis facilitates communication among project personnel and provides the medium for management and control of development. Through this mechanism, problems may be recognized and addressed before their consequences become too significant.

The requirements for effective project scheduling and control are:

1. The development of an organized approach (work program) to the project in terms of tasks to be completed and appropriate review points. The basis for this should be the planning process described above.

2. The use of estimating guidelines to forecast total effort.

3. The assignment of personnel to tasks.

4. Day-to-day reporting on effort expended against the tasks reflected in the work program and review of the products developed.

5. Uniform reporting at prescribed intervals to permit progress to be monitored and quality control reviews to be conducted.

Reporting provided by a project scheduling and reporting system permits individual tasks to be monitored while groups of tasks and the project as a whole can be monitored at higher management levels. A statewide project scheduling system should be developed (or acquired - several good ones are available) to provide uniform project scheduling and reporting. All projects should be reflected in and reported through the system, regardless of the agency involved.

Effectiveness Audits

The last phase in the systems project planning process described above is the post implementation review of costs and benefits. Briefly, a computer system is effective if:

1. The system adheres to predetermined and well-conceived system design, audit trail and control standards.

2. The system's operation meets substantially all of the objectives and cost and benefit criteria originally anticipated when the system proposal package was approved.

3. The user department(s) is satisfied with the system.

Currently, there is no formal program in effect in Montana to assure the effectiveness of systems, and there are no published audit trail or system control standards.

In order to incorporate this phase into the systems development planning process, the following procedures are recommended:

1. The Office of the Legislative Auditor should develop guidelines for audit trail and internal system control requirements, and should undertake a program of continuous audits and review of computer based systems.

2. Audits performed by the Office of the Legislative Auditor should verify that statewide standards covering systems design, systems development procedures and systems documentation are observed.

3. At the time a system proposal is approved, there must be well-defined objectives the system is to meet. This would be the responsibility of the user department.

4. During the development process of design through implementation, there must be sufficient review and coordination to insure that the objectives are being met. This would be a joint responsibility of the user department and the development team and the Office of the Legislative Auditor.

5. A post-implementation review of the system must be performed to determine the extent to which original objectives have been met. Corrections, if necessary, are then implemented. This would be the joint responsibility of the user and the development team.

6. The user departments must continually assess the effectiveness of their systems and initiate steps to correct weaknesses through maintenance and modification work requests or new system development requests and proposals.

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4.5 A Mechanism to Set Priorities

The State presently has no formal procedures for information processing priority setting. This section discusses the methodology for assigning priorities to proposed computer systems development projects. The recommended process is based upon the following strategies:

1. Priority setting, or the process of comparing one system project against another and assigning a relative ranking, must of necessity be somewhat arbitrary. Therefore, the final approval regarding priorities should be centralized within the Office of Budget and Program Planning. This will provide for consistency in decision making by a person who is relatively independent from the consequence of those decisions when conflicts arise.

2. To maximize the soundness of the decisions made, the process diagrammed in Exhibit V should be followed. This will insure that the decisions are made at the right time and that they will be based on all known facts.

3. Regular maintenance and minor modification projects (as discussed under Production System Support in Appendix III) should not go through the priority setting mechanism defined here. Maintenance or modifications to correct a program error is, of course, done immediately. Otherwise, the production system support analysts and programmers (be they Department of Administration or agency employees) should work against a backlog of requests. Priority on backlogged requests should be agreed to informally. Only if a serious disagreement develops should a maintenance or minor modification project be brought to the MODPAC for discussion and, if necessary, resolution through the Office of Budget and Program Planning.

4. All major modifications and new systems development requiring greater than three man-months of effort are subject to the formal process.

5. Feasibility studies and new systems development requiring less than three man-months of effort are assigned informal priorities as described under (3) above.

A project's priority is examined at least twice and, generally, three times. First, at the completion of a feasibility study when agency management agrees to proceed. Second, after completion of the analysis and preliminary design phase if management decides to have the system installed. Third, during the biennial priority setting processing when the updated, statewide plan is being prepared.

Many agencies will perform the priority setting process solely within their own organization. These are Type B and C users who have internal system development capability (see Section 3.5 for additional information). Of course, Type B users also have to review their priorities with the Department of Administration or other agency (e.g., Superintendent of Public Instruction) whose computer they are going to put the system on. By definition, a Type C user has its own computer. However, if a Type C user must install a system or a portion of a system on another agency's or the Department of Administration's central computer(s), the priority must be jointly agreed to. Type A users (who have no internal systems development capability) and any agency requiring assistance from the Department of Administration in developing a system will assign priorities jointly with the Department.

Priority assignment involves grading the project based on seven priority criteria. This grading process will help insure a thorough analysis of each proposed system and enhance the quality and consistency of assigning priorities. This grading exercise should not replace management judgment, but should be used to give better visibility to the judgment.

The recommended criteria and relative values are listed below. The State should refine and revise the point values as the need arises.

System Characteristics	Points
1. Legal requirement -- The system is the only effective means of meeting legal requirements.	N/A
2. Services to the public -- The system provides significantly greater services which are visible to the public.	25
3. Net economic benefit -- The system generates benefits greater than its cost. Consideration should be given to tangibility of benefits, measurability of costs/benefits, and outside funding.	25

4.	Improved management control -- This includes making the information more reliable and timely.	15
5.	Clear implementation plan -- The means for achieving the benefits should be easily understood.	15
6.	Simplicity -- The system should be kept as simple as possible.	10
7.	Broad usage -- This reduces the duplication of systems.	10
TOTAL		100

The priority criteria should be published in order that they be viable statewide. In this way, the criteria will provide an incentive to propose systems which are effective, practical, and well supported by feasibility study reports. Experience at grading proposed systems must take place before the grading process will really become effective. Below are some comments regarding the grading process.

1. Legal requirements -- The State meets most of its legal requirements without developing new systems. However, if a new legal requirement can only be met by installing a new system, then it automatically receives a very high priority. Even when this happens, it is suggested that the grading process be completed.

2. Services to the public -- Most proposed systems in the State do not directly affect services to the public. More often, they are cost-effective means to help State employees provide services. Services can be provided by helping State citizens save time and money, and by improving health and safety. Points should be given only when an improvement in service is significant and obvious to the general public.

3. Net economic benefit -- By net economic benefit, it is meant that the sum of benefits from operating the system will exceed the cost of designing, installing and operating the new system. Obviously, if the costs exceed the benefits, the project gets no points. The evaluation should consider return on investment over a three- to five-year period. The greater the benefit per dollar invested, the more points the project received. Consideration should also be given to the reliability of the estimates and the tangibility of the savings.

4. Improved management controls -- Systems which improve management controls will result in a net economic benefit to the State, but this

benefit is often intangible. This criteria recognizes that these systems should not be unduly penalized because the benefits come via an improved management process rather than directly from the proposed system itself.

5. Clear implementation plan -- More points are given to those projects whose implementation can be easily communicated and understood. Also, a clear implementation plan adds to the reliability of the estimates used to determine the net economic benefits.

6. Simplicity -- In order to steer the designers toward more simplistic design, the project with a simpler system is awarded more points. A system that is complicated to design, install and operate receives no points.

7. Broad usage -- If the system benefits all departments in the State, it will get the full 10 points. If it benefits only one department, it receives no points.

After the grading process has been completed and a priority assigned by all agencies or units involved, the report with the recommended priority is subjected to a quality control review. This quality control review is performed by the Department of Administration for general state government agencies and statewide projects, and by the Commissioner of Higher Education for the University System's units. The quality control review insures that statewide standards have been adhered to in performing the feasibility study and preparing the report and that the priority set followed the statewide criteria. The priority set must also be reviewed against the current statewide, system development plan to insure that all questions as to resources to be used have been answered and that all parties affected have been able to make a contribution to the priority setting process. The question of whether this project might be combined with an already planned project in another agency or unit should be answered. If the project could be combined, this would raise the priority based on criteria number 7. This process will help insure that unnecessary, duplicate systems are not put into the plan.

After the quality control review and any additional discussion and work and possible priority adjustments by the parties involved, the report should be ready for review by the Montana Data Processing Advisory Committee

(MODPAC). If there have been any problems or disagreements between the various agencies or units or with the Department of Administration or the Commissioner of Higher Education, the MODPAC becomes the open forum for all concerned parties to state their point of view before the final priority is assigned by the OBPP. If there is agreement between all parties, the MODPAC reviews the report to insure all statewide considerations have been taken into account. If the MODPAC takes exception with anything in the report or the priority, this is also discussed in the open forum environment of the committee with parties stating their points of view.

The final step in the priority setting process before the project is entered into the system development plan, is for the OBPP to approve the priority for the project. Generally, this priority will be the priority assigned in the report by the involved parties. If all parties are not in agreement, the OBPP will assign a priority based on the report and all the facts presented to the MODPAC by the different parties involved. In some cases, feasibility study reports will be accompanied by requests for additional resources. This might happen with a large project when current uncommitted resources are not adequate for a new high priority project. These requests will be considered along with the priorities when they are assigned.

After the OBPP approves the priority, the project is entered into the current system development plan by the Department of Administration. This is part of the continuous planning discussed in the preceding section. At this point, the priority setting process is complete. The priority set here is still subject to change if conditions change. In the biennial priority assignment function, discussed earlier, all priorities are re-evaluated in light of the current statewide criteria and point values.

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4.6 Relating the Planning Process to the Statewide Organizational Structure

This section discusses how the State's various agencies should execute the process which has been described in Sections 4.1 through 4.5 for statewide planning and control of information processing. It is assumed that the reader is familiar with the contents of Chapter 3, Organization.

Execution is a relatively straightforward process and is most easily presented as follows:

1. On-going agency surveys, feasibility studies and development projects are the responsibility of the agency itself. An agency (whether Type A, B or C) can request assistance from the central resource, the Department of Administration.

2. The role of individual agencies vis-a-vis the Department of Administration and the Office of the Commissioner of Higher Education in setting priorities was described in Section 4.5.

3. The Department of Administration is responsible for compiling the biennial plan, as well as issuing the revised, statewide systems development plan every six months. In this role, it also develops recommendations on growth guidelines and size of development capabilities, for Type B and C users. It may also recommend changes to those portions of the plan submitted by each agency, including that for the University Units submitted by the Commissioner of Higher Education.

4. The MODPAC is the forum for developing recommendations and suggesting changes relative to the plan as compiled and submitted by the Department of Administration. Status reports on individual projects and utilization of information processing personnel and equipment throughout the State are also presented (at least monthly) to the MODPAC.

5. The Governor, through the Office of Budget and Program Planning, has the ultimate responsibility for approving the plan to be submitted (which, in turn, supports portions of the budget plans submitted to the Legislature) as well as the location, type and quantity of information processing resources (whether people, equipment or system).

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EXHIBIT III

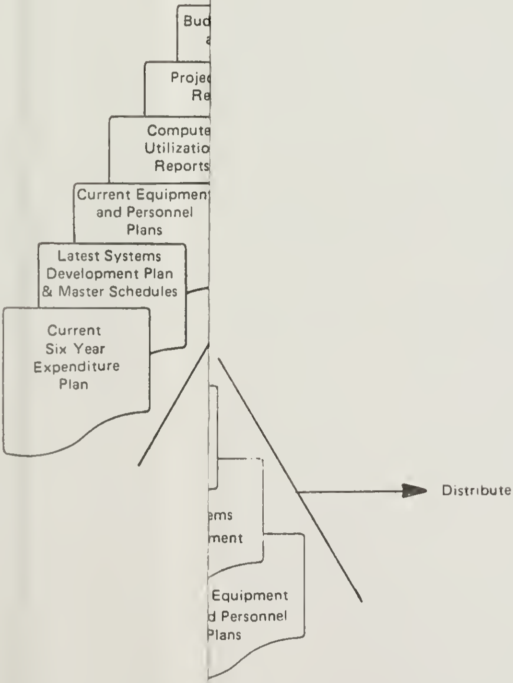
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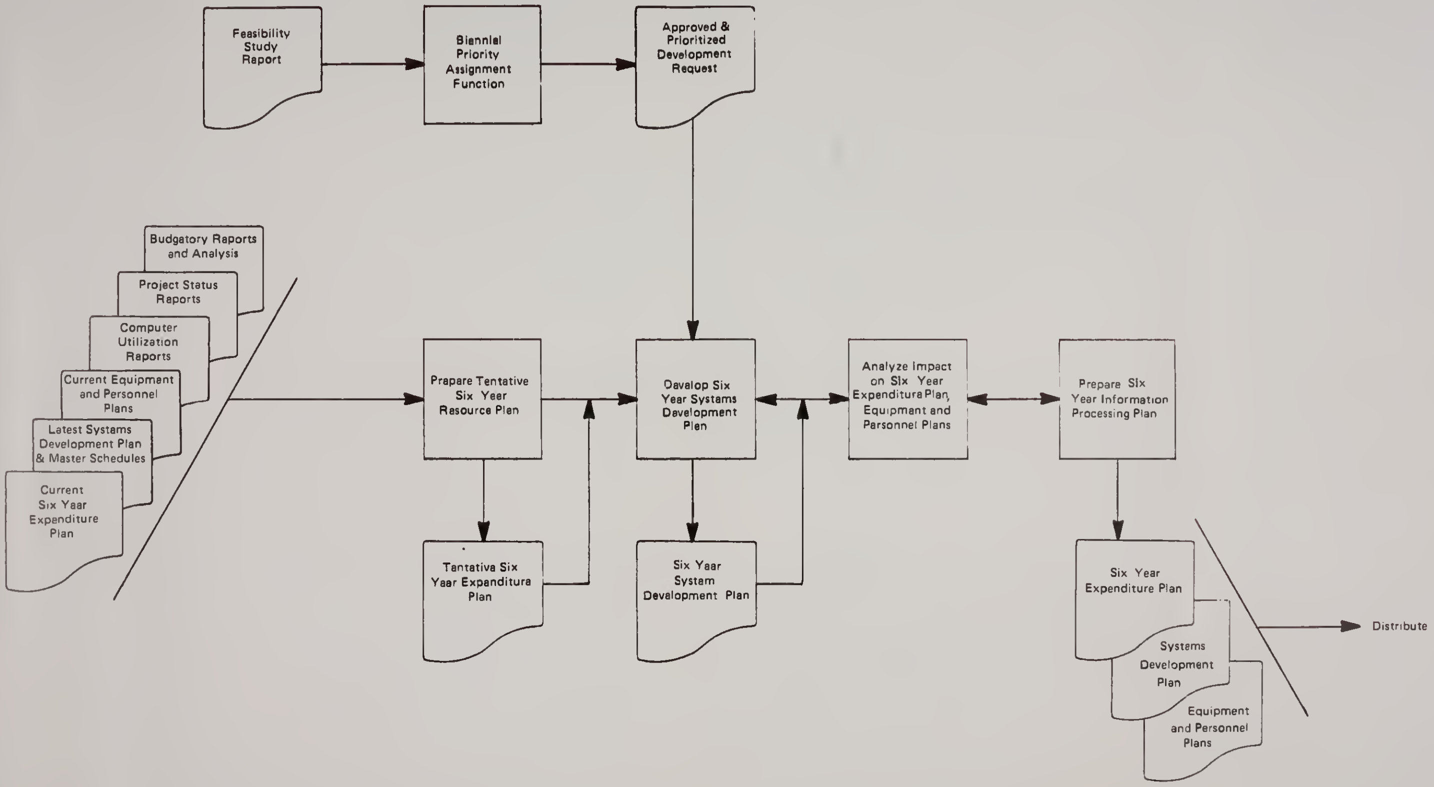
EXHIBIT III

STATE OF MONTANA
BIENNIAL PLANNING PROCESS



Feasibility Study Report
Biennial Priority Assignment Function
Approved & Prioritized Development Request
Budgetory Reports and Analysis
Project Status Reports
Computer Utilization Reports
Current Equipment and Personnel Plans
Latest Systems Development Plan & Master Schedules
Current Six Year Expenditure Plan
Prepare Tentative Six Year Resource Plan
Develop Six Year Systems Development Plan
Analyze Impact on Six Year Expenditure Plan, Equipment and Personnel Plans
Prepare Six Year Information Processing Plan
Tentative Six Year Expenditure Plan
Six Year System Development Plan
Six Year Expenditure Plan
Systems Development Plan
Equipment and Personnel Plans
Distribute

EXHIBIT IV

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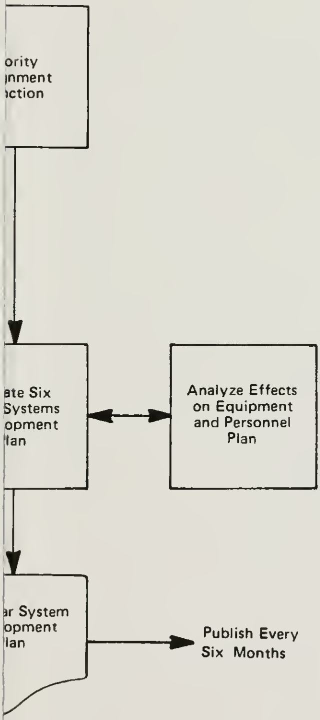

EXHIBIT IV

STATE OF MONTANA
CONTINUOUS PLANNING PROCESS

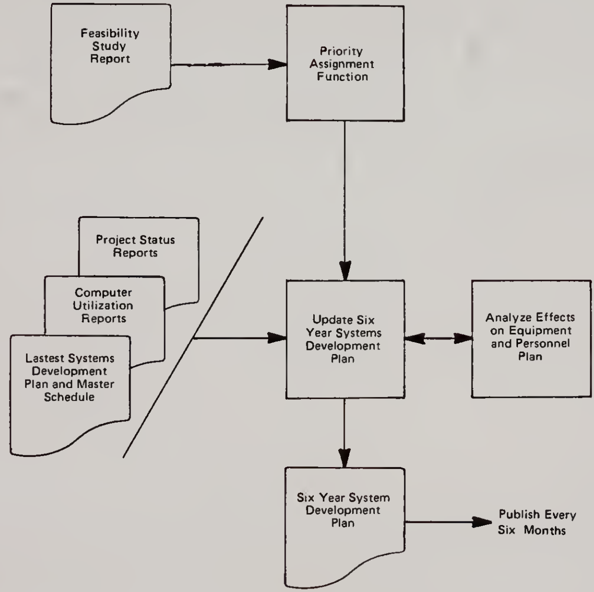
Feasibility Study Report
Priority Assignment Function
Project Status Reports
Computer Utilization Reports
Lastest Systems Development Plan and Master Schedule
Update Six Year Systems Development Plan
Analyze Effects on Equipment and Personnel Plan
Six Year System Development Plan
Publish Every Six Months

EXHIBIT V

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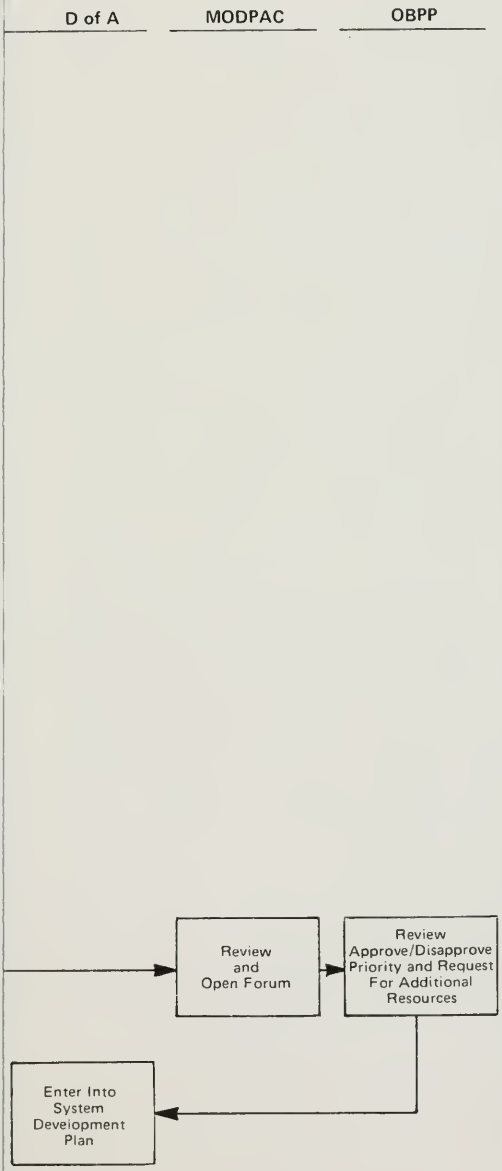
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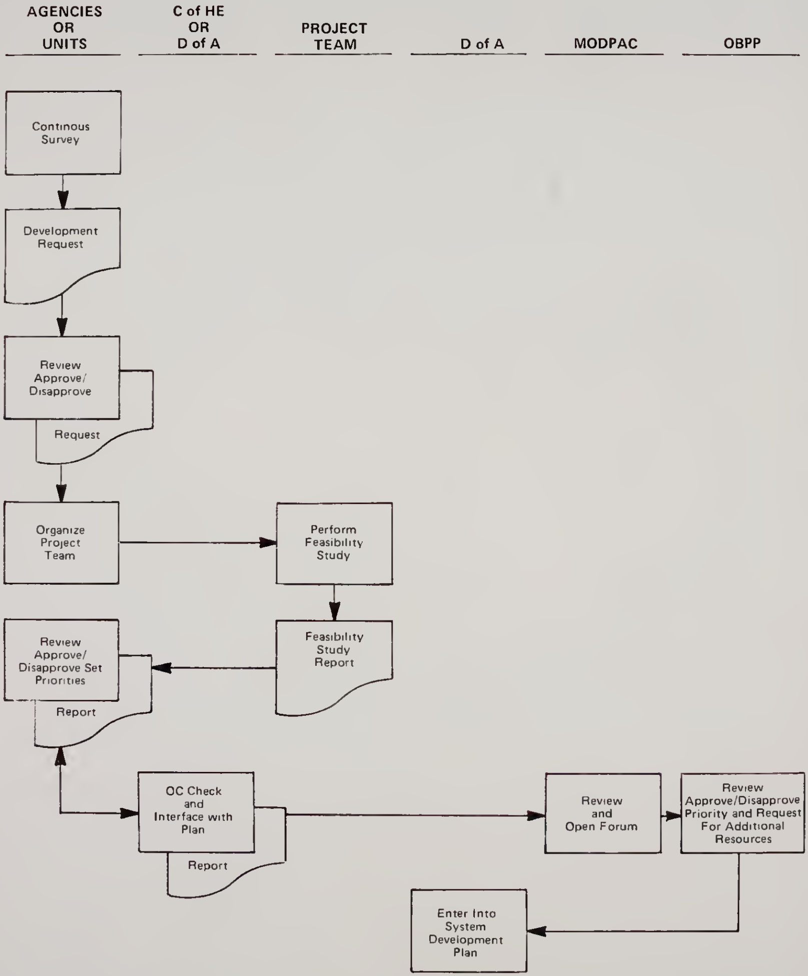
Review and Open Forum
Review Approve/Disapprove Priority and Request For Additional Resources
Enter Into System Development Plan

EXHIBIT V

PRIORITY SETTING FOR SYSTEM DEVELOPMENT PROJECTS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Report
OC Check and Interface with Plan
Report
Review and Open Forum
Review Approve/Disapprove Priority and Request For Additional Resources
Enter Into System Development Plan

CHAPTER 5 PHASE I RECOMMENDATIONS

5. PHASE I RECOMMENDATIONS

This chapter is organized as follows:

5.1 Introduction

5.2 Positioning Recommendations

5.3 Critical Issue Recommendations

5.4 Completing the Detail Plan

5.5 Related Recommendations

5.1 Introduction

Recommendations resulting from Phase I of the project to develop a statewide long-range information processing plan are summarized in this chapter. The recommendations have been restricted to those which are attainable during the calendar year 1977, and are grouped into four categories.

1. Positioning recommendations -- These should be effected prior to completing the detail, long-range plan. The State will derive significant benefits through implementing these recommendations, whether or not a detail plan is prepared. However, if implemented, these recommendations will enable the State to execute, monitor and update the long-range plan.

2. Critical issue recommendations -- Two tasks should be completed since the results have potential budgetary implications in the current fiscal year.

3. Recommendations to complete the detail plan -- Phase I has confirmed the need for and the viability of a statewide plan. This recommendation discusses key steps required to complete the initial six-year plan.

4. Related recommendations -- Several other tasks should also be completed during the development of the detail plan, if resources permit, since the results will impact the direction and details of the plan itself.

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5.2 Positioning Recommendations

These recommendations fall into four areas:

1. Organization and Assignment of Responsibilities
2. Biennial and Continuous Planning
3. Systems Development Project Planning and Control
4. Equipment Utilization Planning and Control

Organization and Assignment of Responsibilities

Chapter 3 of this report presented recommendations for establishing an organization framework and assigning responsibilities for statewide planning and control of the information processing function. Section 3.5, Organization Structure, contains eight such recommendations. The section on Policies and Guidelines (Section 3.6) presents suggested policies and guidelines in support of those recommendations.

Recommendation -- The eight recommendations (Section 3.5) and policies (Section 3.6) should be implemented as the highest priority task in Phase II. The general guidelines (Section 3.6) should be evaluated and recommendations developed prior to completing the detail long-range plan.

Biennial and Continuous Planning

Chapter 4 of this report presented recommendations for planning for statewide information processing:

1. The four phases for preparing and updating the six-year information processing plan are outlined in Sections 4.2 and 4.3.
2. A priority setting mechanism, including proposed criteria, is described in Section 4.5.

Recommendation -- The planning methodology outlined in Chapter 4 should be adopted by the State and used as the basis for completing the statewide, long-range information processing plan.

Systems Development Project Planning and Control

Chapter 4 of this report also discussed and presented recommendations in the area of systems project management. Five elements of effective systems project management are described:

1. Definition of a standard approach to systems project planning (details of a recommended approach are presented in the Appendix III, Volume 2 of this report).
2. Development of systems design standards.
3. Development of estimating guidelines and procedures for their use.
4. Implementation of a comprehensive project reporting and control system.
5. Implementation of an effectiveness audit program.

Recommendation -- It is recommended that a project be undertaken by the Department of Administration to develop effective systems project management techniques for implementation statewide. The recommended tasks are:

1. Adopt the approach to systems project planning described in the Appendix III and implement the related procedures and documentation requirements.
2. Develop systems design standards and systems project estimating guidelines.
3. Develop (or acquire - several good ones are available) a statewide project reporting and control system for use statewide.
4. Assist in implementing an effectiveness audit program.

Equipment Utilization Planning and Control

During Phase I, limited reviews of computer utilization were made. It was noted during the reviews of the two primary data centers, Department of Administration and Department of Highways, that there is excess computer capacity during non-prime time shifts while capacity is continually being increased to meet prime-time requirements. The reviews also disclosed that no formal job scheduling was in effect. Job scheduling is done informally by the users who specify the computing needs and priority for each job executed.

Both centers have internal utilization and reporting capabilities in place. These are used to monitor current operations and project future equipment requirements for planning purposes. The reports are also used to "fine-tune" system software to some extent, although limited use is made for scheduling purposes (e.g., balancing job mix) to improve throughput. Both centers also try to encourage non-prime shift usage by offering discounted rates during late shifts. Nevertheless, there appears to be an imbalance between total capacity and total needs.

A comprehensive equipment plan is an important part of the six-year information processing plan discussed in Chapter 4 (Section 4.2). The present level of computing capability necessitates top-management involvement to monitor and control computer utilization.

Policies and a comprehensive utilization reporting and control system should be in place to assist this management effort. Policies should be established in such areas as:

1. Level of user service
2. Schedule adherence
3. Response time
4. Turnaround time
5. Backup requirements
6. Other areas

A reporting and control system should be in place to provide timely and accurate information to management at the appropriate level of detail to enable effective decision-making. The nature of management responsibilities and, consequently, information requirements for decision-making differ at the various levels of the organization. It is important that the summary reports provided to higher management are supported by reporting that is used to evaluate and control operations on a day-to-day basis. In this manner, top-management can observe developing trends which give rise to questions answered by more detailed technical reports at the lower levels. This is just as true when managing the use of equipment as when managing people.

The reports listed below illustrate the types which could be presented to management to aid in their planning and control of information processing equipment utilization. However, the reports should not be considered all inclusive.

1. Capacity/Utilization Reports -- Show actual performance versus budget.

2. Service Level Reports -- Report on overall performance with respect to user service.

3. Planning and Scheduling Reports -- Used to prepare detail daily schedules, monitor backlog and to generate utilization forecasts.

4. Component Utilization Reports -- Used to monitor trends in usage and to identify potential bottlenecks in configuration and work loading. These reports should also serve as supporting detail for recommendations to top management regarding major configuration changes.

5. Control and Exception Reports -- Support the daily operating decisions made by the operations analyst and the operations manager.

Recommendation -- A Phase II task should be undertaken by the Department of Administration to define a general operations reporting and control scheme for use statewide. The benefits to be derived would include better control over utilization of the State's computer hardware resources, better information upon which to evaluate hardware acquisition alternatives and improved customer service levels.

The project should include the following:

1. An in-depth study of computer utilization at the two data centers using hardware and/or software monitors and determination of specific recommendations in such areas as:

   a. equipment configuration

    b. scheduling and job mix

    c. data/device locations

2. Recommendation of policies on service levels and other items discussed above.

3. A plan for implementing the study recommendations including a utilization reporting scheme. This plan should be incorporated into subsequent Phase II tasks or the detail long-range plan depending on resource availability.

It is important that the utilization reporting and decisions resulting from such reports be visible to all agencies impacted by the plan. Therefore, a portion of the utilization reporting should be directed toward the MODPAC via summary reports.

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5.3 Critical Issue Recommendations

There are two tasks which should be completed since they may have statewide budgetary implications in the current biennium.

1. Computer Rate Study
2. Equipment Centralization/Decentralization

Computer Rate Study

Currently, the approach to billing users of information processing resources provided by the State's two primary data centers (Department of Administration and Department of Highways) encourages use of Highways' computer. The billing algorithm and cost components differ between the centers. Because of this economic differential, many of Highways' users are reluctant to support any plans to combine the centers.

Billing algorithms and cost components used by State information processing centers should minimize rate differences between the centers. Once an investment is made in resources, those resources should be made available at costs which have no "built-in" economic preference from the user's standpoint. The user should be primarily concerned with whether his needs are being met and service levels are satisfactory.

If there is an imbalance between costs of operating a data center and recovery (or reimbursement) of those costs, the answer is not necessarily to adjust rates. Rather, the utilization of people and equipment and cost effectiveness of the center should be studied. The study should result in specific recommendations to curtail, relocate or make other changes to the data center. The organization recommendations given in Chapter 3 are necessary in order to provide the visibility and mechanism for the success of this approach.

Billing for services rendered between State agencies involves many issues and questions. Each must be considered in analyzing the approach to billing. If the State of Montana is to maintain a system of charging for the use of centralized data processing facilities, it is important to develop an approach that is fair, recognizes the economic realities, and yet does not bias the users. Typical questions that are addressed in determining the approach to billing include the following:

1. Specifically, what is the State's objective in charging back costs to users?
    a. Strengthen controls over data processing costs?
    b. Develop cost-consciousness among users?
    c. Assist in determining total costs for various basic State functions?
    d. Aid in recovery of external funding where appropriate?
    e. Others?
2. Will users be charged for all costs of the central information processing group?
    a. What are the appropriate overhead elements?
    b. What are restrictions on overhead charged to externally (federally) funded projects?
3. Will users be charged for computer processing based on productive time but at a rate which absorbs management, rerun and other support costs?
4. Will rates be based on projected utilization over a fixed period of time (such as a year) or, will an average amount be in effect until there is a major change in a user's system or in the cost of central information processing services?
5. Will rates be structured to influence certain kinds of utilization, such as discount rates for late shift and weekend computer processing?
6. Will rates penalize users for inefficient or nonstandard practices?
7. How will charges for the statewide systems be allocated? For example, will the cost of a statewide payroll/personnel/position control system be charged to each user or absorbed by the Department of Administration? If charged to each user, on what basis?
8. Should users be separately charged for the cost of equipment and software installed solely for their benefit?

9. Must the charges for computer services be competitive with comparable services available elsewhere? Should this include other agencies as well as the flexibility to go outside?

10. How is the cost of processing and storing shared data to be distributed?

The approach used to allocate costs must be simple and easily understood by users. Users should be able to see a cause-effect relationship between their decisions and the increase or decrease in the charges for computer services. If the cost allocation technique is based on time and rates, it is important that the approach adopted allow the rates for services to remain stable over an extended period of time.

Recommendation -- A task should be undertaken to study and develop an equitable charge-back policy that minimizes discrimination between the computing faciliites used. The objective of the study should be to develop an understandable billing algorithm that charges fairly for the resources used, minimizes the competitive pricing situation that currently exists for standard processing, and charges the user according to the computing capabilities utilized. The task should be assigned a high-priority, and be performed in conjunction with the resolution of the centralization/decentralization issue.

Equipment Centralization/Decentralization

One of the main issues that surfaced during Phase I was that of equipment centralization. Two major computer centers, operated by the Department of Administration (DOA) and the Department of Highways, provide services to their respective departments and to other agencies. Currently, there is a plan to combine these two computers into a central site in order to improve back-up and reliability and achieve certain economic advantages from having a shared facility. This plan is confirmed in a letter of intent signed by the two agencies.

Several agencies expressed concern over the consolidation plan in their response to the user survey. Among the most commonly expressed concerns were the higher costs charged by the DOA, whether responsiveness to users would suffer and whether the proposed level of reliability the consolidation would provide (i.e., 100% reliability) was required. The data collected in Phase I indicate that the problem is a complex one. For example:

1. The Department of Highways surveys indicated a desire to retain their computer for internal use and transfer other agencies to the central site operated by the Department of Administration. One of the main users of the Highways' facility is the Department of Justice. The Department of Administration cannot support the demand for on-line processing required by Justice with its current capacity.

2. The Department of Highways' current capacity has been justified, in part, by other user demand and this capacity can not be justifiable if solely for the use of that Department.

3. Presently, users of both data centers enjoy a very high level of equipment reliability. In fact, the level is above that experienced for similar sized data centers in other states. However, since the overall demand for service will surely grow (especially in the teleprocessing and on-line areas), the question has been raised whether the data centers can continue to maintain this high level of service without an auxiliary power source and back-up support for systems and software. Auxiliary power and back-up capability would be easier and less expensive to provide if the centers were located in the same facility.

4. The rate structures used by the two centers to charge back costs are different as discussed in the rate study recommendation. This produces concern for costs among users.

5. Many of the users and personnel directly affected by the consolidation are unfamiliar with the ramifications and impact of the decision to move in either direction. The opinions of many are supported by emotional rather than business and economic arguments.

6. Recent technological developments may offer alternative methods of accomplishing the same objectives. These may warrant further study and analysis.

There are numerous philosophical pros and cons to the centralization issue. For example, with centralization:

1. It is easier to develop higher levels of expertise by concentration and specialization.

2. It is easier to assess and maintain an overall sense of direction and perspective and it eases the mechanics of long-range planning.

3. It is easier to maintain overall control and eliminate duplication.

4. It is possible to provide greater flexibility in personnel policies with a central location.

5. It is easier to justify acquisition of specialized equipment and software because of greater volumes.

There are also arguments against centralization:

1. The central agency can be less sensitive and less responsive to other agencies' requirements.

2. Unproductive, "middle management" positions may more easily occur.

3. It tends to result in greater systems complexity - hence, greater implementation problems.

4. It reduces "flexibility" of users to tailor systems to their needs or "management style."

5. It may result in a greater lag in time between initiation of a user's request and the response.

Recommendation -- The decision to consolidate the Department of Highways' computer with the Department of Administration's will have a major impact on future planning for statewide information processing. Moreover, the cost and difficulty associated with changing the direction increases over time. In view of this, it is recommended that the letter of intent be re-confirmed and the decision be re-examined, if required, prior to consolidating the facilities. A project should be organized to address this issue as a high-priority Phase II task with the results presented to the MODPAC.

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5.4 Completing the Detail Plan

Development of the detailed, long-range information processing plan should build on the work performed during Phase I and the results of the positioning tasks discussed in Section 5.2. The key tasks which must be accomplished are as follows:

1. Complete in-depth reviews of all State agencies, including the University System.
2. Work with agencies in completing feasibility studies for new systems development projects. There are several potential statewide systems that should be studied for implementation or enhancements. These are discussed more fully in Section 5.5 of this chapter.
3. Complete the other tasks defined in Section 5.5 if resources are available to do so. Define others to be completed in year 2 of the detail plan and beyond.
4. Prepare a tentative statewide expenditure plan as described in Section 4.2 of Chapter 4. It is important to note that, for this initial long-range plan, 6-9 months of the first biennial period will have passed before the expenditure plan for the statewide program has been completed.
5. Perform the priority setting process as defined in Section 4.5 of Chapter 4.
6. Prepare the initial statewide systems development plan as discussed in Chapter 4.
7. Examine the resulting balance of development resources to development needs. The University System and the Department of Administration will be required to make recommendations to the OBPP regarding the type and location of development resources. Agencies will have to justify their in-house resources before the MODPAC as discussed in Chapter 4.
8. Complete the equipment and personnel plans as defined in Chapter 4.
9. Complete the systems development and expenditure plans. This is an iterative process as defined in Chapter 4.
10. Publish the long-range plan.

One segment of State government, the Montana University System, will pose a somewhat unique problem to preparation of the statewide plan. This entity is presently developing a long-range plan encompassing research, instructional and administrative computing needs. The latter area directly impacts statewide planning. Integration of the University System's plan with that of general government is an important aspect of completing the detail, statewide long-range plan.

Recommendation -- It is very important that the State of Montana proceed with development of the detail, long-range plan. While much will be gained from completing the positioning recommendations described in Section 5.2, they only provide a launching platform for achieving effective and efficient use of information processing resources by the State. The visibility and momentum resulting from Phase I should be continued by undertaking the effort to complete the initial plan.

5.5 Related Recommendations

Several special tasks should, if possible, be completed in conjunction with preparing the detail plan. Whether or not they can, in fact, be completed will depend upon how quickly Phase II begins and whether there are available resources (people and/or dollars). However, each task will have important ramifications for the direction and content of the plan. These tasks are:

1. Study of Training, Skills Upgrade and Career Paths
2. Data Base Study
3. Study of Statewide Systems Requirements

Study of Training, Skills Upgrade and Career Paths

The review of systems and programming groups in the various agencies disclosed for the most part a relatively high turnover rate. The causes were attributed to lack of career paths and training opportunities. Inter-agency competition has also resulted in a number of "promotional" transfers. Although there is some formal training being done in the various groups, management has not established a consistent statewide approach for the development and utilization of training resources. Materials and courses available in individual agencies are not coordinated on a statewide basis. Therefore, personnel needing training in an area may not be aware that it could be obtained in another agency. In general, there is very little commitment to providing time for training. As a result, information processing personnel have not been given the time to participate in training activities nor have training requirements been developed and enforced.

It was also determined that analysts and programmers frequently perform both programming and analyst tasks, especially where inter-agency movement of data personnel is common. This is an indication of the lack of integration between personnel classifications and skill levels developed through training and experience. In addition, career development is not defined in such a way that (1) allows each part of the organization to recruit experienced personnel, and (2) provides personnel with visible promotional opportunities at each level of progression.

Recommendation -- A task is recommended for Phase II to address and minimize these problems. The objectives of the task would be to strengthen training programs in order to develop and improve skills, develop a method to aid in assigning tasks commensurate with skill levels, and develop visible career paths. The following approach is recommended:

1. The State should begin by formalizing policies (using the MODPAC forum) and procedures related to maintaining and utilizing a statewide training program. This effort should include steps to:
    a. Develop procedures and assignments for identifying and evaluating the new training programs.
    b. Establish overall guidelines for the amount of time to be spent on training during the year and integrate this time into the budget and work plan.
    c. Establish policies for the evaluation of participants in training activities.
    d. Incorporate training into job promotional requirements.
    e. Develop policies for the enforcement of educational requirements.
    f. Establish procedures for maintaining the educational system and data.
2. Training requirements should reflect personnel classification. Some areas which should be considered for incorporation include:
    a. CICS and on-line systems
    b. MARK IV
    c. Systems documentation and technical standards
    d. Project management and control
    e. Personnel development
    f. User department operations
    g. Management and supervision

3. Each data processing employee's current skill level and personnel classification should be evaluated in light of the training prescribed for that level. From this evaluation, immediate training needs can be determined.

4. All work assignments relative to development projects should then attempt to match tasks to the skill level required and thereby maximize return on the investment in training.

5. Relative to career progression, it is recommended that all organization levels and units within the statewide information processing organizations define a primary path of promotion or transfer for key positions. Alternate promotion and transfer paths should exist if the individuals' background permits. These career paths should be visible to agency management and the individuals progression should be periodically evaluated in terms of the available paths.

The Department of Administration should be assigned the responsibility for developing and administering a statewide training program. This assignment should include a provision for inventorying current skill levels and upgrading these levels through training as required.

Data Base Study

Data base management systems are receiving increased attention throughout the country. This new technology offers many advantages to the design of new systems. In Montana, several agencies are currently contemplating the design or acquisition of new computer applications utilizing data base management software. One agency recently proposed the acquisition of a software package developed by another state as a means to satisfy one of its information processing needs. The system was data base oriented. Its acquisition was deferred because the central data center (Department of Administration) and the user development group did not have sufficient technical expertise required to support it.

Several data base management systems are in wide use today. TOTAL, ADABAS, IMS, IDMS and DL1 are just a few of the systems available. The selection of one of these software systems should be based on an analysis of which of the packages is best suited to the State's needs, not on the specific application utilizing the software. Otherwise, the State can expect to acquire several data base software systems over time and be forced to develop technical expertise in each of them.

Typically, the selection of a data base management system is preceded by the creation of a data administrator position. A data administrator provides central planning and control over data definition and related documentation. He organizes the data base(s) to interface efficiently with related systems and to include all logical relationships required by users of the information. In this role, he interacts with users of data, analysts, programmers and information processing activities. This function makes possible a well-designed and documented data base and provides a natural link between users of information, analysts, programmers and computer operations personnel.

Recommendation -- It is recommended that the State defer any commitment to data base management software until the completion of Phase II of the long-range plan. During Phase II, the position of data administrator should be established and filled and a study should be performed by the Department of Administration to identify potential data base applications and recommend software, if appropriate.

Relative to the study to determine the potential applications and recommended software, the following steps are recommended:

1. Formally investigate and report to the MODPAC the potential applications and benefits to be derived from data base management systems. This response should include broad estimates of cost, resources and effort to implement data base management software.

2. Once an implementation project has been approved, formally evaluate the available software and report the results to the top management of information processing.

3. Once the best software has been formally selected, identify a small, noncritical pilot application, with only limited exposure outside the central information processing organization, to convert to the data base management software. This will minimize the adverse effects on and reactions by the major users while the information processing staff is learning and experimenting with the new software.

4. Once the pilot application has been successfully converted, begin conversion of other more sensitive and critical applications.

Steps 3 and 4 should be included in the detail long-range plan developed during Phase II.

The data administrator should be assigned the following responsibilities:

1. Serve as a focal point for all information related to the definition of data, such as data base and file content, source or transaction data and report data.
2. Review and approve all data base designs (regardless of whether data base management software is used).
3. Monitor and maintain the assignment of code values.
4. Define and implement procedures and control techniques to insure the security of user data files as specified by the user and/or statutes.
5. Monitor a "dictionary" of data items and user files for usage statistics, and also monitor any automated data dictionary's reorganization requirements.
6. Distribute system documentation to requesters.
7. Establish and enforce standards for documentation, data base design, and system controls, such as backup, recovery, and restart.

The institution of a data administrator and the enforcement of his authorities over data identification and data structure necessarily means that the detail design decisions should be moved to a higher level in the organization. The level of the data administrator should be comparable to a division administrator.

Study of Statewide Systems Requirements

The user surveys and reviews of systems development groups revealed that there is a great deal of development planned and in-progress. Much of this development is unique to agency needs. However, some of the desires and plans indicate a need for statewide applications.

Specifically, needs were expressed relative to five systems areas which are discussed in the order of apparent priority:

1. Payroll/Personnel/Position Control -- The State's Central Payroll System and the Position Control System are not well-integrated and the State currently has no personnel system. Several agencies indicate strong needs that can be fulfilled by this statewide application.

2. Statewide Budgeting and Accounting System (SBAS) -- This system has been in operation for some time. Users indicate systems needs that are potential sub-systems to SBAS or enhancements or modifications to that system. Many requests for changes and enhancements have come from the University System.

3. Property Accounting -- A property accounting system has been a recognized need for some time. Design has progressed on this on a time-available basis thus far.

4. Accounts Receivable -- Several agencies, in particular the Department of Revenue, indicate plans to develop systems to fill this need.

5. General File Maintenance Capability -- Many agencies individually collect data which is converted into files for use in research and statistical reporting. A general table/file maintenance capability could be used to collect common data for access by all agencies.

Recommendation -- Statewide systems of the type described above provide the basic tools for management. The first four potentially represent a well-integrated financial information system while the fifth could provide a general data collection and retrieval capability. It is recommended that the State undertake the development of shared, statewide systems as soon as possible to preclude the duplication of effort that will otherwise result. This effort represents a significant undertaking in terms of manpower commitments. Therefore, a feasibility study should be completed for each system during Phase II to set the scope, objectives and benefits. The priorities should then be reviewed and development undertaken based upon priorities assignment and resource allocation. This effort should include an investigation of similar systems available from other states as a means of more rapidly satisfying statewide needs.

CHAPTER 6 REQUIREMENTS FOR PHASE II

6. REQUIREMENTS FOR PHASE II

Phase I recommendations are presented in Chapter 5 in the recommended priority sequence. Chapter 6 is organized similarly. Each section in Chapter 5 is presented as a segment in Chapter 6 and each recommendation in Chapter 5 is a task except in two instances. Section 5.4, Completing the Detail Plan, is a single recommendation in Chapter 5, but is made up of the following three tasks in Chapter 6:

1. Review Agencies and University System Units in Detail
2. Conduct Feasibility Studies
3. Complete Six-Year Information Processing Plan

The third recommendation in Section 5.5, Study of Statewide Systems Requirements, is not presented as a separate task in Chapter 6. Effort related to this recommendation is incorporated into the task, "Conduct Feasibility Studies."

The order and time frame of the work segments as shown in the bar chart (Exhibit VI) depicts the ideal situation in which all tasks are addressed and assumes necessary resources will be available. The man-day estimates are provided to indicate an order of magnitude for the tasks and should not be considered final.

Exhibit VII is a summary work program that outlines the steps associated with the completion of each of the tasks. The "Organization and Administration" task includes a step to set the scope and objectives for Phase II. Since efforts will be required of the various government entities for most of the tasks, the purpose of this task is to finalize the manpower available to work on Phase II. Based on available resources, a decision can then be made as to which tasks will be included in Phase II. Tasks which are not included become part of the detail plan developed in Phase II.

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EXHIBIT VI

Segment	Task	Description
100		PHASE II OVERALL ORGANIZATIO
	01	Organization and Administration
200		IMPLEMENT POSITIONING RECOM
	02	Organization and Assignment of Respo
	03	Biennial and Continuous Planning
	04	Systems Project Planning and Control
	05	Equipment Utilization Planning and Co
300		IMPLEMENT CRITICAL ISSUES RE
	06	Computer Rate Study
	07	Equipment Centralization/Decentraliz
400		COMPLETING THE DETAIL PLAN
	08	Review Agencies and University Syster
	09	Conduct Feasibility Studies
	10	Complete Six Year Information Proces
500		IMPLEMENT RELATED RECOMME
	11	Study of Training, Skills Upgrade, and
	12	Data Base Study

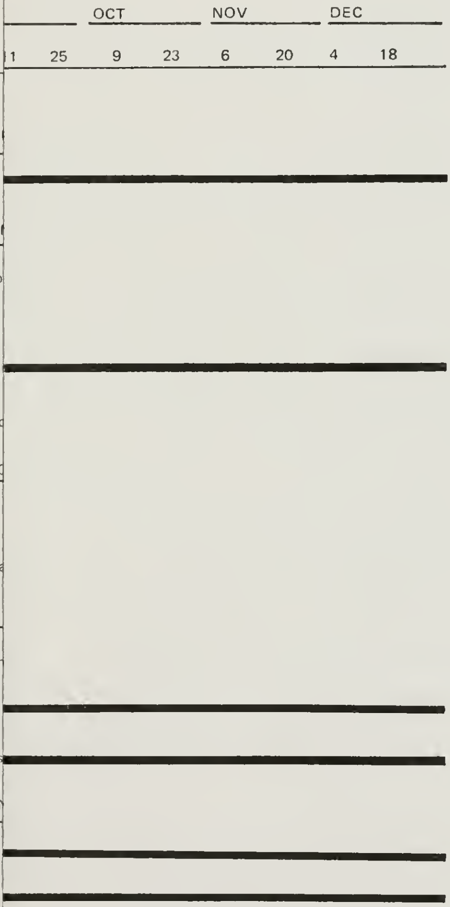

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EXHIBIT VI

STATE OF MONTANA
WORK PROGRAM
SUMMARY BAR CHART

Segment	Task	Description	Estimated Man-Days
100		PHASE II OVERALL ORGANIZATION AND ADMIN.	
	01	Organization and Administration	250
200		IMPLEMENT POSITIONING RECOMMENDATIONS	
	02	Organization and Assignment of Responsibilities	40
	03	Biennial and Continuous Planning	25
	04	Systems Project Planning and Control	185
	05	Equipment Utilization Planning and Control	60
300		IMPLEMENT CRITICAL ISSUES RECOMMENDATIONS	
	06	Computer Rate Study	75
	07	Equipment Centralization/Decentralization	75
400		COMPLETING THE DETAIL PLAN	
	08	Review Agencies and University System Units	500-700
	09	Conduct Feasibility Studies	800-1200
	10	Complete Six Year Information Processing Plan	60
500		IMPLEMENT RELATED RECOMMENDATIONS	
	11	Study of Training, Skills Upgrade, and Career Paths	120
	12	Data Base Study	80
			2270-2870

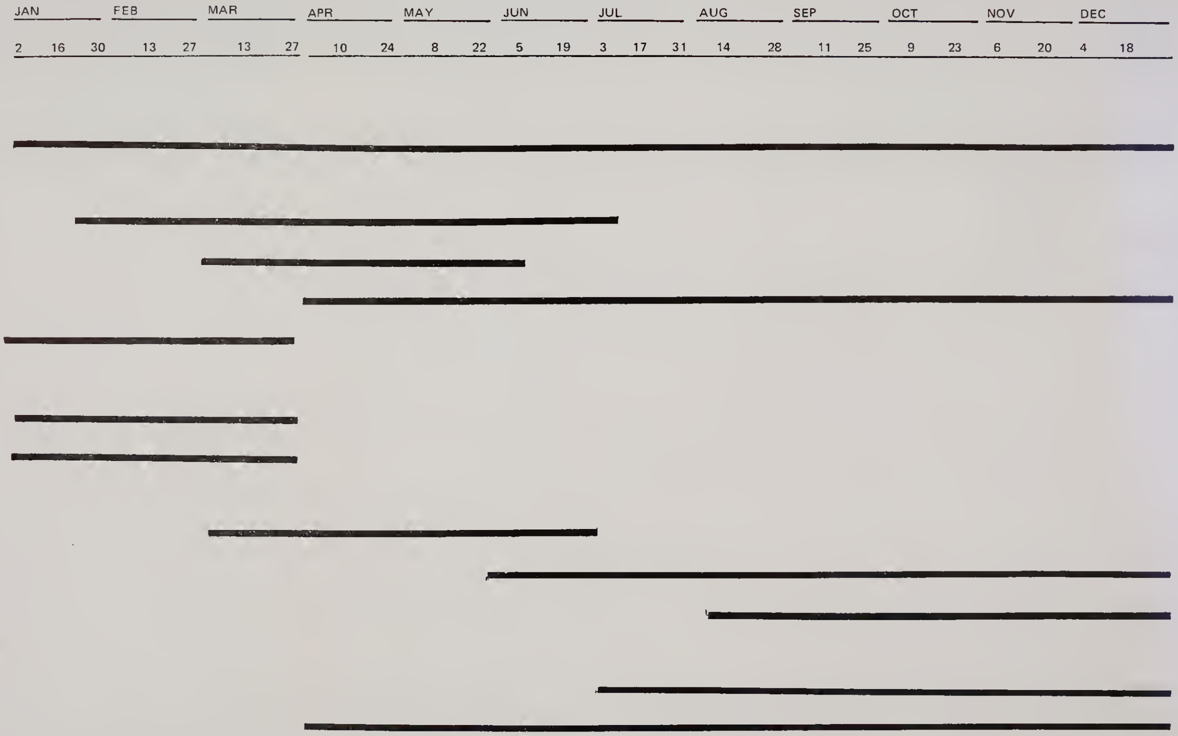

EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
100		PHASE II OVERALL ORGANIZATION AND ADMINISTRATION	
	01	Organization and Administration	250
		This task provides the overall organization and administration for Phase II. In addition, each task will have an organization step. The primary objectives of this task are to (1) provide for active participation by senior management in the State; (2) define the scope of Phase II in terms of what will be undertaken and who will do the work; (3) insure that Phase II is properly planned, that a work program is prepared in sufficient detail and that the scope and objectives of each program task are defined and (4) provide on-going progress monitoring and reporting on Phase II. The objectives of this task will be met by the following steps: - Provide for management involvement - Set scope and objectives for Phase II - Prepare detail work program - Provide on-going project administration	

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EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
200		IMPLEMENT POSITIONING RECOMMENDATIONS	
	02	Organization and Assignment of Responsibilities	40

This task establishes the organizational framework necessary for planning, coordinating and controlling the statewide information processing function including development and implementation of the long-range plan. The primary objectives of this task are to (1) provide the framework for effective management and operations and (2) provide a clear understanding of the organizational roles and responsibilities. These objectives will be met by the following steps:

- Organize task
- Review organizational recommendations, policies and guidelines from Phase I
- Develop detail plan to implement recommendations, policies and guidelines
- Identify and draft necessary legislation
- Formalize and publish roles and responsibilities
- Implement organizational recommendation, policies and guidelines
- Develop procedures to assist the execution of new or revised responsibilities
- Develop the information processing program reporting capability

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STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
	03	Biennial and Continuous Planning	25

Statewide planning recommendations were presented in Chapter 4 of this report. Sections 4.2 and 4.3 describe biennial and continuous planning procedures. The objectives of this task are to (1) review and approve the biennial and continuous planning process and (2) develop detail policies and procedures where necessary to support the planning process. The steps necessary to meet the objectives of this task are listed below:

- Organize task
- Review biennial planning and continuous planning processes
- Develop detail policies and procedures necessary to support biennial and continuous planning processes
- Present biennial and continuous planning policies and procedures to the MODPAC
- Implement the processes

EXHIBIT VII

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STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
	04	Systems Project Planning and Control	185

In order to develop effective systems which meet their planned objectives there must be systems project planning and control standards and procedures. The necessary standards and procedures are outlined in Chapter 4, Section 4.4. The objectives of this task are to (1) define a standard approach to the system project planning process, (2) develop systems design standards and guidelines (including on-line systems), (3) develop estimating guidelines, (4) implement a project reporting and control system, and (5) implement an effectiveness audit program. These objectives will be met by the following steps:

- Organize task
- Review all current systems project planning and control standards and procedures in use in the State
- Define standard approach to system project planning process
- Develop standards, procedures and guidelines necessary to support the systems project planning process
- Develop training materials and conduct training meetings on the standards and procedures to be implemented
- Convert to the new standards and procedures
- Design a project reporting and control system and/or evaluate available packages

EXHIBIT VII

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EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
	04	Systems Project Planning and Control (continued)	
		- Present recommendation on design of the project reporting and control system or package selected to the MODPAC	
		- Develop required procedures and implement the project reporting and control system adopted	
		- Develop procedures for implementing effectiveness audits	
		- Present effectiveness audit procedures to the MODPAC	
		- Implement the effectiveness audit program	
		- Incorporate all systems project planning and control guidelines, standards and procedures into a statewide systems project planning and control manual	
		- Publish systems project planning and control manual	

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EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
	05	Equipment Utilization Planning and Control	60

The level of resources committed to providing the computing capability necessitates effective management of computer utilization. To manage effectively requires policies and a reporting system to assist the process. The objectives of this task are to (1) determine how utilization might be improved, (2) recommend policies for service level requirements and (3) design a formal utilization reporting scheme. These objectives will be met by the following steps:

- Organize task
- Perform in-depth study of computer utilization at the State's two primary data centers (If hardware or software monitors are utilized, the man-day estimates should be adjusted)
- Develop recommendations on improving computer utilization
- Develop recommendations on service level requirements
- Design the computer utilization reporting scheme
- Prepare plan for implementing computer utilization and service level recommendations and computer utilization reporting system

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EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
300		IMPLEMENT CRITICAL ISSUES RECOMMENDATIONS	
	06	Computer Rate Study There currently exist different billing approaches at the State's two primary data centers, Department of Administration and Department of Highways. The objective of this task is to develop and implement a common billing approach that charges uniformly for the resources used. The following steps are necessary to accomplish this objective: - Organize task - Review in detail the current rates - Determine scope and objective of charging costs to users and develop charge-back policy recommendations - Prepare computer rate study recommendations - Present findings and recommendations to the MODPAC - Implement Computer Rate Study recommendations	75

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EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
	07	Equipment Centralization/Decentralization	75

One of the main issues that surfaced during Phase I was that of equipment centralization between the Department of Administration and Department of Highways. This task addresses that issue. The effort required is dependent on whether the decision is merely confirmed or a full-scale analysis of the decision is to be made. However, to demonstrate the potential effort required, the estimates assume that a full review is conducted. The following steps are necessary:

- Organize task
- Gather and analyze data
- Complete cost/benefit analysis
- Develop equipment centralization/decentralization recommendations
- Present equipment centralization/decentralization recommendations to the MODPAC
- Prepare work program for implementing recommendations

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EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
400		COMPLETING THE DETAIL PLAN	
	08	Review Agencies and University System Units in Detail	500 - 700

It is necessary in this phase to amplify the work performed in Phase I. In this task the agencies and units will be reviewed in greater detail to determine in more depth their information needs. The objectives of this task are to (1) review present systems to determine if they are meeting management needs and whether any major modifications or redesigns are necessary, (2) review in more detail current development and desired development, (3) identify any additional projects not already noted and (4) document all projects in a standard format. The following steps are designed to meet these objectives:

- Organize and administer the effort
- Develop format for development request (this step could be part of the Systems Project Planning and Control task, but is included here because of the timing in Phase II)
- Identify criteria for assigning system priorities
- For each agency or unit:
    Review information collected in Phase I
    Interview management personnel
    Review present systems (Manual and Automated)
    Summarize information needs using standard format for development requests
    Assign development priorities
- Combine related system projects
- Review priorities for projects

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Segment	Task	Description	Estimated Man-Days
	10	Complete Six-Year Information Processing Plan This task relies heavily on the prior planning tasks and critical issue tasks for input. Phase I information and current year budgetary information will also provide valuable input. The objectives of this task are to (1) summarize the findings and conclusions of the preceding tasks and Phase I, (2) finalize priorities for system development, (3) reconcile and resolve implementation resource conflicts and (4) draft the six-year information processing plan. These objectives can be met by the following steps: - Organize task - Update data processing cost, equipment and personnel information from Phase I - Develop tentative statewide expenditure plan - Develop tentative equipment plan - Develop tentative personnel plan - Develop tentative system development plan - Re-evaluate all tentative plans - Prepare draft of six-year information processing plan - Present six-year information processing plan to the MODPAC - Publish six-year information processing plan	60

EXHIBIT VII

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EXHIBIT VII

STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
500		IMPLEMENT RELATED RECOMMENDATIONS	
	11	Study of Training, Skills Upgrade, and Career Paths	120

Formal training programs and defined career path progression is necessary for the State's data processing personnel. The objectives of this task are to (1) develop training programs and career path progressions and (2) to implement a skills upgrade plan and an on-going plan to allow normal career path progression. The objectives of this task will be met by the following steps:

- Organize task
- Review all data processing training programs available in the state
- Determine other sources of training programs available to the State
- Evaluate training material available for sale/use and develop recommendations
- Define career path progressions
- Develop policies and procedures for maintaining and utilizing statewide training programs
- Inventory current skills
- Develop training plan for initial skills upgrade and continuous career path progression
- Approve/disapprove training plan
- Implement training plan

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EXHIBIT VII

Segment	Task	Description	Estimated Man-Days
	12	Data Base Study A prerequisite to selecting the software components of a data base system is establishment of the data administrator position. This task assumes that a data administrator would be hired prior to the detail study of data base needs. The objectives of this segment are to (1) determine the need for a data base system and (2) determine the data base software components that would best meet this need on a statewide basis. The following steps are designed to meet these objectives: - Organize task - Determine position requirements of a data base administrator - Develop final recommendation on data base administration - Hire data base administrator - Summarize data base information from feasibility studies - Determine need and requirements for data base management system software - Determine need and requirements for data dictionary system software - Determine need and requirements for data base inquiry system software - Prepare recommendation on need and requirements for data base system software - Present recommendation on need and requirements for data base system software to the MODPAC	80

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STATE OF MONTANA
PHASE II
WORK PROGRAM

Segment	Task	Description	Estimated Man-Days
	12	Data Base Study (continued)	
		- Evaluate available data base system software packages	
		- Prepare recommendation on data base system software packages	
		- Approve/disapprove recommendation on data base system software packages	

EXHIBIT VII

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